AAF REVIEW

AUGUST 1946

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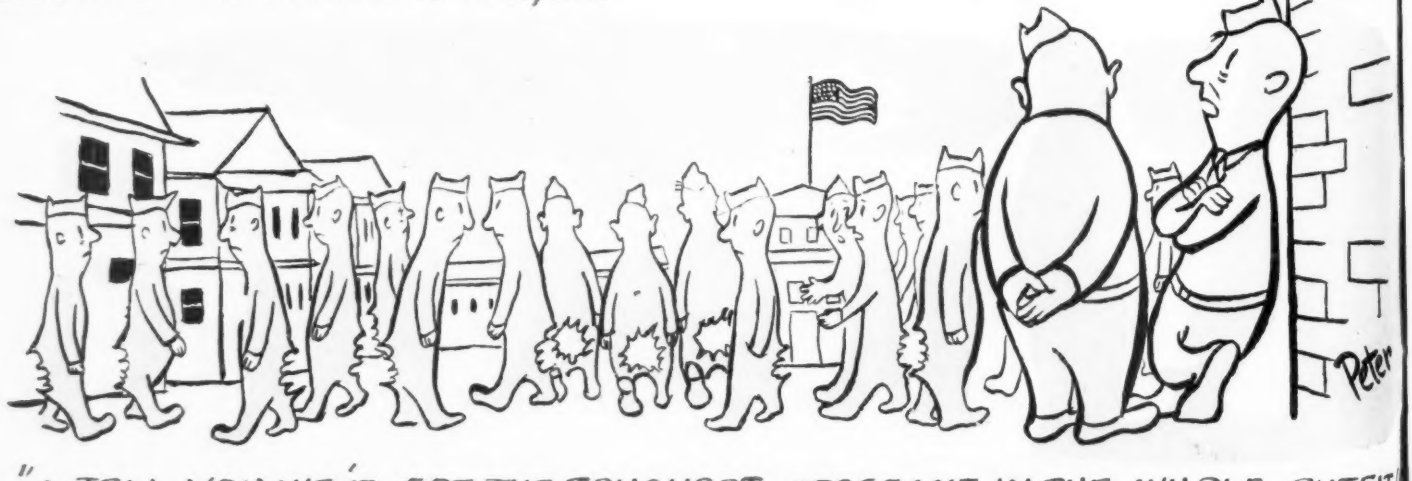
AAF SKETCH BOOK

by CPL. P. PLASENCIA
AAF REVIEW Staff

I'LL TELL YOU WHEN WE GET OVER YOUR HOME TOWN, NOW QUIT BOTHERING ME !!"

"HERES THAT NEW PILOT REPORTING FROM KITTYHAWK, SIR"



"I TELL YOU WE'VE GOT THE TOUGHEST SERGEANT IN THE WHOLE OUTFIT!

Intercom

Wants Pilot Training

Dear Editor:

I have signed category I indicating my willingness to remain on active duty for the duration plus six months. I have heard of some form of authorization which allows AAF officers with ratings other than pilot to submit application for pilot training. I have been unable to locate this authorization on the island and would like to know if you can help me. There are several others who are also interested in applying.

Lt. Frederick J. Plass
3rd Reconnaissance Squadron
APO 234, San Francisco, Calif.

Under the provisions of AAF Letter 50-161 dated 14 January 1946, pilot training in officer grade is available to all commissioned officers of the AUS, rated or non-rated, on duty with the AAF, who meet certain requirements. The requirements pertinent to your case are to be physically qualified for flying, Class I, in accordance with AR 40-110, be accepted for training prior to reaching twenty-seven years of age, indicate in writing your willingness to remain on extended active duty for a period of three years after completion of training unless sooner relieved, willingness to accept a Regular Army commission if tendered one and to accept such assignment as may be given and be recommended for a commisison in the Regular Army on latest AAF Form 123.

Applications will not be accepted from individuals from units in which the personnel have been frozen, those awaiting shipment overseas or those on foreign duty. However, upon return to the ZI qualified applicants will be eligible.

In conclusion, there is at present a moratorium on pilot training until October 15, 1946.—Editor.

Discharge of Reservists

Dear Editor:

Is there at present any provision for the remaining Air Corps Enlisted Reserves, who are still on active duty, to be discharged in the near future as has been provided by the Navy for their reserves now on active duty?

Most of us wish to remain as members of the Air Reserve but want inactive duty so we can begin college in the fall term of September. We enlisted in 1944.

Pvt. O. S. Vaughan
Langley Field, Va.

When you entered on active duty you become a member of the Army of the United States and will be discharged under the same War Department provisions that apply to all AUS personnel.

In order to remain as Air Reserves you will have to join the Air Corps Enlisted Reserve after discharge under the provisions of the appropriate Army Regulation. All eligible men are given this opportunity at separation centers.—Editor.

Who Authorized It?

Dear Editor:

Your article "Battle Honors" in the June 1946 issue states that the 345 Bombardment Group (M), 5th Air Force was awarded a distinguished unit citation for

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AAF REVIEW

THE OFFICIAL SERVICE JOURNAL OF THE U. S. ARMY AIR FORCES

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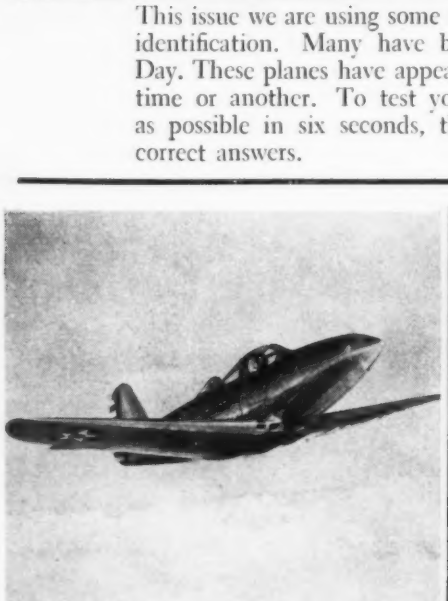
HOW SHARP ARE YOU?

This issue we are using some new types of aircraft for photo identification. Many have become operational since V-E Day. These planes have appeared in AAF REVIEW at one time or another. To test your memory, identify as many as possible in six seconds, then turn to Page 48 for the correct answers.



1. True or False? This is a P-51.

2. True or False? This is a C-74.

3. True or False? This is a C-54.

4. True or False? This is a P-39.

5. True or False? This is a Jap Baka.

6. True or False? This is a C-82.

Intercom

(Continued from Page 1)

lew level attacks on Saigon. Can you give me the authority for this citation?

Lt. Robert D. Frust
Keesler Field, Miss

The authority for this citation is General Order 2217, Headquarters Far East Air Forces, 29 November 1945 for action on 28 April 1945.—Editor.

15th Jealous of Record

Dear Editor:

I have detected a slight inaccuracy in your answer to one of the Letters to the Editor in your March-April issue. Though it was a small mistake, I should like to bring the correction to your attention, because those of us who flew with the 15th Bombardment Squadron (L) are jealous of its record.

In answering a question as to the first heavy bombardment group to operate in EAME, you stated in part, "The first operation by USAAF heavies out of UK was on 4 July 1942 when some planes of the 97th Bombardment Group (H) and the 15th Bombardment Squadron (L) participated in a raid against airdromes in the Low Countries. The planes flew as part of an RAF mission and formation."

The USAAF planes which took in this effort, the first officially recognized action against occupied Europe, were six DB7s of the 15th Bomb Squadron (L). No heavy bombers operated on that mission, and in fact, did not operate until 17 August.

As a matter of interest, the 15th operated independently during its short wartime existence. Sent over to UK in April, 1942, as a night fighter squadron, its mission was changed to light bombardment upon arrival there. It carried out several operations from England and was then assigned to the new 12th Air Force. On 14 November the 15th was ordered to North Africa and successfully completed the longest flight attempted by DB7s when all 13 aircraft flew from an English airdrome to Oran without mishap.

Allan J. Wash, Jr.
Capt, AC

Will Johnny Grow Up?

Dear Editor:

Little Johnny's Daddy didn't quite grow up . . . he was just 20 or 21. It happened during the Battle of the Bulge.

Why mightn't little Johnny grow up either?

Supersonic guided missiles or maybe nuclear fission phenomena, are two good reasons why Johnny may not grow up! His Daddy didn't grow up because of some things called "blitzkreig" and "rocket bombs" and "V-2".

You see, supersonic guided missiles are new weapons of war that can destroy an entire community in a matter of seconds and without any warning at all. They fly about 3,000 miles per hour and they can come across the ocean while you are eating your dinner.

So you understand now, that there won't

Intercom

be time to put up signs like "Every Minute Counts" or to organize local fire wardens and "spotters" or to make patriotic speeches and get the people to realize we have to protect ourselves against an enemy.

Makes you scared? It should—because the AAF REVIEW is no "Super Man" comic. So we might as well know the United States isn't the only country that knows about supersonic guided missiles and nuclear fission phenomena.

If Germany had had six more months to work on experimentation a lot of little Johnnys would never have been born. So what do we do now?

Well, while many of us are enjoying high-powered cars and radios with FM and Television and nice homes with pretty lawns, we had better put in a little time and research on the meaning of the old Boy Scout adage BE PREPARED.

And to BE PREPARED, means that adequate peacetime measures must be taken to provide an air industrial development that will give to America security and the potential strength to defeat any attacker. There must be complete cooperation between the military and the civilian, working together in research for peace or for war. Call it preparing for peace, if you don't like the word war, but BE PREPARED!

Any attempt to attack the United States would undoubtedly come from the air and so we should have an Air Force second to none. There is no better insurance against war than a powerful Air Force. Already, a government committee—the Air Coordination Committee— has made a study of the postwar aircraft industry and recommends establishment of an Air Industrial Plan, based on four keys, which follows:

(1) An adequate research and development program that carries through production in limited quantities to provide production proving and service testing.

(2) The maintenance of a healthy nucleus of an aircraft industry capable of rapid expansion supported by a program of continuing military production.

(3) The assurance of an industrial reserve of production facilities and resources.

(4) A program of specific industrial preparedness plans undertaken jointly between the Air Force and industry to maintain our newest air-weapons in a state of readiness for volume production.

This program is something for you to support. It will support you against the worst thing in the world—WAR! The Air Industrial Plan is a good basis for a start on the road to PREPAREDNESS!

Let's see to it that more little Johnny's grow up—*with* their Daddys!

Ed. Gravett, PRO Staff,
Wright Field, Ohio

THIS MONTH

Thirty-nine years ago US airpower came into being with three men and no airplanes as a unit in the Office of the Chief Signal Officer of the Army. Today it looks into the awesome Air Age of the future from the pinnacle it reached in World War II as the most formidable air force in the world. This growth, from the stature of mosquito to eagle, was punctuated in the last days of war with the tearsome exclamation points in the sky made by the atomic mushroom clouds over Hiroshima and Nagasaki, and more recently over Bikini Iagoon.

This month the AAF celebrates its 39th birthday by continuing its work in laboratories and on the field, to maintain its stature as one of the chief custodians of the world's peace. In this issue on Pages 4 and 5 a three-gun salute, both to the past achievements of the AAF and to its future responsibilities, is presented in the form of anniversary greetings from President of the United States Harry S. Truman, Assistant Secretary of War for Air W. Stuart Symington and AAF Commanding General Carl Spaatz. On Page (4) the President is pictured signing his proclamation. With him are General Spaatz and Gen. Ira C. Eaker, Deputy Commanding General, AAF.

Despite widespread initial disappointment over damage inflicted on the atom bomb target fleet in Bikini Lagoon by the first of the scheduled three explosions in Operation Crossroads, subsequent inspection of the target area and a careful review of all aspects of the first bombing add up to an unqualified success for Task Force 1.5, as reported in detail in the story, "Able Day at the Crossroads" on Page 6 by Charlotte Knight, AAF REVIEW staff writer. Miss Knight has followed Operation Crossroads from its formation for training many months ago to the actual bomb-drop itself.

☆

From the same scene comes the story, "Atomic Minute Men," on Page 11 by Capt. John P. Merrill, Group Surgeon of the 509th Composite (Atom-Bombing) Group, who tells of the little-publicized but highly important job of the Air Monitors, whose task is to keep strictly accurate tabs on the presence of radioactivity not only in the target area but in the vicinity adjacent to it and the machines and men suspected of having been exposed to the emanation.

☆

"Wings Against the Storm" on Page 14 is the work of Lt. Harmon H. Harper, REVIEW staff writer, who this month for the first time gives a play-by-play account of what the AAF is and has been doing to get the right answer to the perennial 64-dollar question: How do you fly a thunderstorm? Lieutenant Harper reports on the special investigation currently in progress at Pinecastle Army Air Base, Orlando, Fla. Here there are assembled, in the Lieutenant's own words, "the latest testing devices under the supervision of specialists from the AAF, Navy and civilian agencies to develop scientific procedures for flying thunderstorms, thereby reducing the hazards."

☆

Officers and men of the 47th Light Bombardment Group, currently winding up a rigorous night operations program in A-26s under the Tactical Air Command, are doing their part to be fully prepared—in event of emergency—to put a thoroughly trained and hard-hitting fighting force in the air on short notice. These operations are reported in the story, "Operation Blackout" on Page 17, by Lt. Hal J. Basham, a new member of the REVIEW staff, who was formerly a member of this Group.

☆

What goes on today in seven of the eight major commands of the AAF—their responsibilities, programs and objectives—is presented this month in overall reports in a special section entitled "Command Performances," starting on Page 27. These commands are: Air Materiel Command, Strategic Air Command, Air Transport Command, Air Defense Command, Tactical Air Command, Air Training Command and Air Proving Ground Command. The eighth major command, Air University, was reported on in the July issue of the REVIEW by Maj. Gen David M. Schlatter.

☆

The REVIEW in this issue publishes for the first time the story of the technical development of aviation in the US since the beginning of the 20th Century. Entitled "AAF Chronology," this article appears on Page 40 and is the work of Sgt. Vivian L. Schectman, REVIEW staff writer, who obtained most of her material from Wright Field documents. Collaborating with Miss Schectman in research was Capt. William W. James, OIS Radio Branch.

☆

August also is significant to the AAF as the month of victory over Japan. Now, a year later, the 5th Air Force is "On Watch" over Nippon, as described on Page 19.

☆

Our August cover is the work of Cpl. Peter Plasencia of the REVIEW staff. It depicts the advancement of the AAF over 39 years—from the days of wire and bamboo pushers to the eve of supersonic flight. Corporal Plasencia used old photos of Orville Wright as his model for the 1907 airman. While Capt. William M. Mettler, Jr., REVIEW art department chief, was the unknowing model for the high-altitude, sonic barrier-smashing pilot.

THE PROCLAMATION OF THE PRESIDENT

Whereas the United States Army Air Force began in 1907 as the Aeronautical Division in the Office of the Chief Signal Officer of the Army, with three men and no airplanes, and has grown to its present stature as one of the chief custodians of our future; and

Whereas the Army Air Force contributed greatly to the victories against our enemies in Europe and in Asia, spearheading the attacks and carrying the battle into the heart of the enemy homelands; and

Whereas we look back with pride upon the noble achievements and the courageous deeds of the living and remember in affection the devoted service and the heroic sacrifices of the dead; and

Whereas we look forward to the increasing importance of American airpower in preserving the peace; in defending America against aggression; and in strengthening the Union of our own country by swift, space-ignoring flight;

Now, therefore, I, Harry S. Truman, President of the United States of America, in order that we may in gratitude do honor to the men and women of the Army Air Force and pay tribute to all those who through research and development, in science and industry, have supported the growth of our country's airpower, do hereby proclaim Thursday, August 1, 1946, as Army Air Force Day, and do invite the governors of the various states to issue proclamations calling for the observance of that day.

I strongly urge all citizens of this country to familiarize themselves with our Army Air Force and to recall in appreciation the importance and the influence of airpower in our national life in pioneering new means of transportation and communication and new contributions to our comfort, our health and our well-being.

In witness whereof, I have hereunto set my hand and caused the seal of the United States of America to be affixed.

Done at the city of Washington this 12th day of July, in the year of our Lord nineteen hundred and forty-six, and of the independence of the United States of America the one hundred and seventy-first.

MESSAGE FROM THE COMMANDING GENERAL AAF

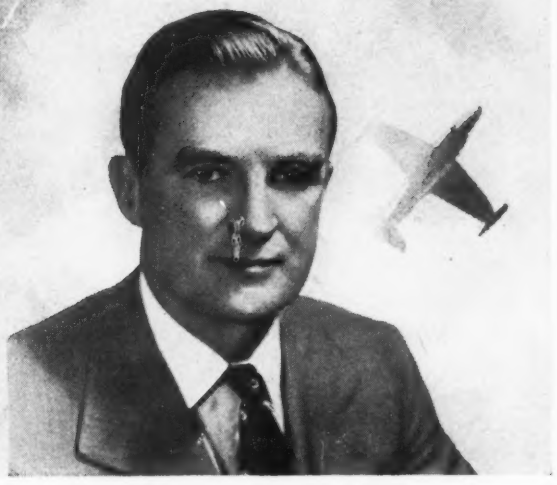
General Carl Spaatz

Thirty-nine years ago today the Army Air Force was born. One officer and two men were assigned to a newly created division of the Signal Corps. The new division was responsible for all matters "Pertaining to military ballooning, air machines and all kindred subjects."

Before the first World War was over, the Air Force had become a strong fledgling. In combat its performance had been brilliant. Many of the pilots who survived the dog fights over France fought on through two decades of peace, preaching their doctrine of airpower.

The impact of a second world war awakened our peace-loving nation to the words of these Air Force prophets. The Colossus of airpower, born of American industry and muscled by American youth, aided immeasurably in the victory of allied arms in Western Europe. In the war against Japan, airpower was the decisive force.

Our Air Force, on the 39th anniversary of its birth, stands as a mighty guardian of world security. Its history is a warning against peacetime complacency and asserts the necessity of keeping American strength in arms until international organization succeeds and world peace is assured.



MESSAGE FROM THE ASSISTANT SECRETARY OF WAR (AIR)

The Hon. W. Stuart Symington

It is with great pleasure that I salute the Air Force on its anniversary. Twice in our memory America has come in last to win a world war. Our ability to overcome the handicap of a late start was primarily the result of the brains and courage of our fighting men and women and our productive capacity.

Less than six years ago and over a year after Hitler overran Poland, a prominent military figure said, "Airships can never win a war, they can never win a battle. How about Crete? A country without a fleet taking a large island from a country with the second largest fleet in the world.

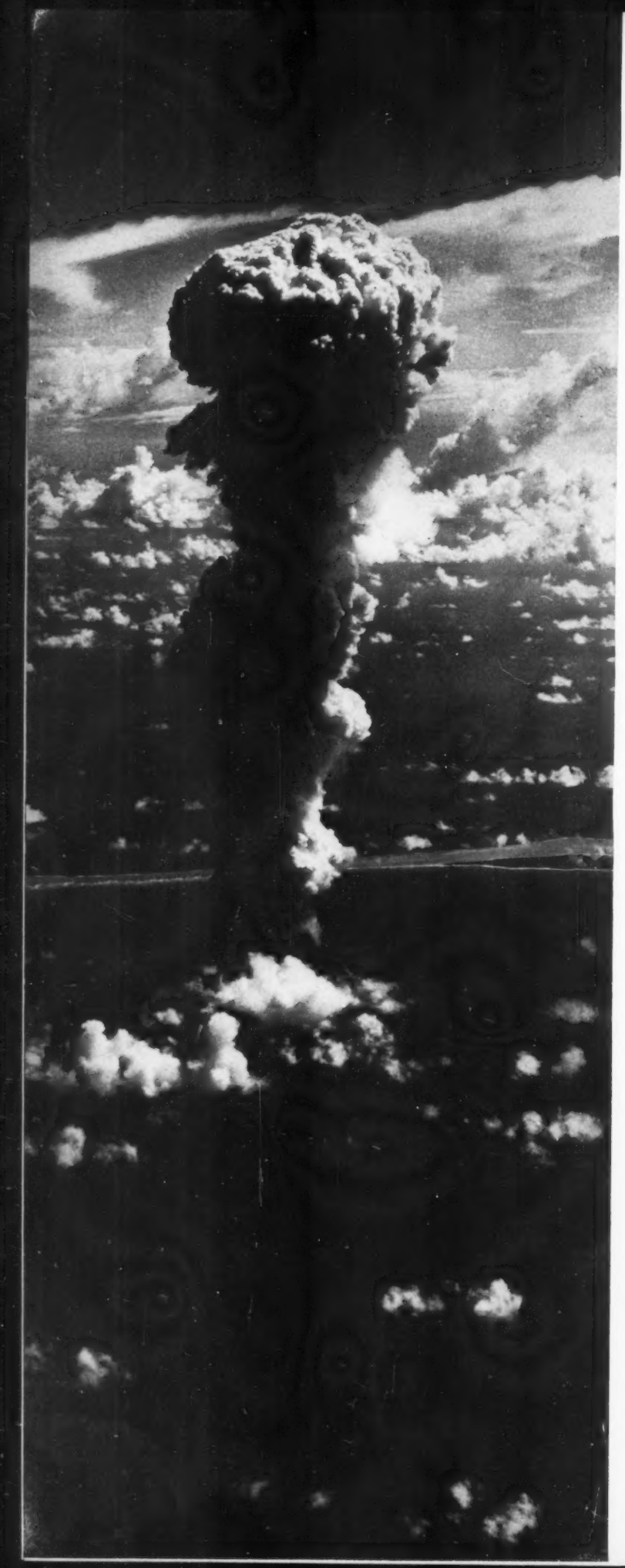
How about the island of Pantelleria, taken by General Spaatz and his men without a soldier landing. And finally and most convincingly how about the complete surrender of Japan with her field armies intact and prior to the landing of any of our armed forces.

The war has shown these prophets against air power of just a few years ago were proved wholly and completely wrong. Let me quote the summary report as of Sept. 30, 1945 of the United States Strategic Bombing survey headed by civilians who went to work on the instructions of the late President Roosevelt.

"Allied air power was decisive in the war in Western Europe. Hindsight inevitably suggests that it might have been employed differently or better in some respects. Its power and superiority made possible the success of the invasion. It brought the economy which sustained the enemy's armed forces to virtual collapse. Its imprint on the German nation will be lasting.

"Speed, range and striking power of the air weapons of the future, as indicated by the signposts of the war in Europe, must specifically be reckoned with in any plans for increased security and strength. The combination of the atomic bomb with remote control projectiles of ocean spanning range stands as a possibility which is awesome and frightful to contemplate."

That was Europe. We all know about Japan. ☆



ABLE DAY AT THE CROSSROADS

Dropping of A-Bomb fulfilled requirements of AAF's mission

By CHARLOTTE KNIGHT
AAF REVIEW *Staff*

The first phase of the greatest military maneuver in history is over. The AAF has dropped the world's fourth atomic bomb on target ships at Bikini. It did not sink the fleet—nor blow all the water out of the lagoon—nor split the world in half—nor did it fulfill other fantastic predictions of many unenlightened feature writers and pseudo-scientists.

But it did accomplish to the complete satisfaction of all participating units the primary purposes of the test as planned by joint Army Navy Task Force—One. First: to evaluate the effects, from maximum to minimum, of a nuclear fission bomb on naval craft and other types of modern military weapons. Secondly: to collect, for scientific study, data regarding radio-activity and other phenomena accompanying an explosion of this type of bomb.

This it did—and more. As for the Air Force, the Able Day Mission has pointed the way to new standards of efficiency both in planning and execution higher than those ever achieved before.

We now know what we are capable of doing for we did it on that early morning of July 1st when aircraft NR 354 took off from Kwajalein for Bikini.

For most of the people on Kwajalein, Able Day's vast complex operation actually began about 24 hours before bomb-drop. To the 3,000 Air Force men who had been sweating-out this day through five long months of training, rehearsals, and round-the-clock preparations, "the word" from Vice Admiral W. H. P. Blandy about 0900 on Able-minus-one that the bomb would be dropped the following day came as the most heartening, even if surprising, news of the month.

Until that moment even the most optimistic crossroaders would not have accepted five-to-one odds that the scheduled July 1 would actually be Able Day itself. Previous dress rehearsals had had to be postponed time and again during the preceding weeks because of the weather, and since photographic demands for clear skies on the Able Mission were even greater than on those occasions, task force personnel were prepared to wait most of July for ideal conditions. But early in the morning on June 30, Col. B. G. Holzman, one of the weather officers who had given General Eisenhower the go-ahead for Normandy's D-Day, advised Admiral Blandy that the following day would be one of the best that could be expected in this area.

From the Admiral's flagship in Bikini, the USS Mt.

McKinley, the order went out to proceed as planned. Down on Kwajalein, some 220 nautical miles to the south, the atmosphere began to grow tense. Singularly, there was almost no fear for personal safety, rather there was only the nervous excitement one could expect on any day before the big game. The only real worries were that the test might still be cancelled before next morning, and everyone fervently hoped the same thing—"Let's drop it and have done with it."

About noontime "it" was removed from its carefully guarded storage place and secretly moved to a specially built, heavily concealed bomb-loading pit. There, shielded from the eyes of all but the armament crew and some key "atom-splitters" who had helped assemble it, the world's fourth atomic bomb, named Gilda and bearing a portrait of Rita Hayworth, was cautiously loaded aboard the B-29 bomb-carrying airplane—"Dave's Dream."

Chief of the armament crew entrusted with this tricky loading operation was Capt. Wayne P. Sage, and whom no one on the island was more anxious to "get it all over with." If anything were to go wrong with the functioning of any part of the bombing equipment, Sage and his crew, some of whom were veterans of the Nagasaki and Hiroshima atom-bombing operation, would be the "fall guys"—a fact they all realize much too keenly. Sage's personal responsibility had doubled on Able Day. On the final "Queen Day" dress rehearsal just a few days previously, his fellow armament officer, Capt. James Bishop, had been killed when he walked into the whirling propellers of Dave's Dream—Kwajalein's only crossroads fatality.

All the rest of that day and all through the night, Sage and his boys kept vigil with Gilda. Pacing the pit with them, except for occasional short snatches of sleep, were Dr. Roger Warner, Manhattan District Project Officer for crossroads, who found his Able Eve assignment less nerve wracking than watching over the Nagasaki bomb on Tinian almost a year ago, and Col. John R. Sutherland, bomb commander. Meanwhile unaware of the delicate operations going on in the pit all the other islanders were in a fever of activity. Headquarters arcade, directly across the runway from the loading ramp, had about it all the tension of those moments just before the big race. More VIPs than there are in Washington bustled in and out of task group offices. For more than a week now the clan had begun to assemble by boat and air—three and four-star Admirals in sun tans and shorts. World renowned scientists in GI green coveralls, congressmen conspicuous in white shirts and civilian trousers, war correspondents whose sleeves still bore combat shoulder patches and assorted technical observers by the dozens were gathered. Seldom could any show boast such a gilt edge audience.

By three in the afternoon all flying crews in the AAF's most modern briefing room and in the darkened hall looked for the final time at the luminous colored panels showing routes to orbit points and targets. It was already cold turkey to everybody present but there was a decided quickening of the pulse when they knew this was the showdown. For each man present the next day's flight was the important single assignment he had ever had and it could not be muffed. Tensely they listened to last minute instructions, winds would be 12 knots at altitude, predicted Maj. Delmar Crowson, weather officer. There would be 8/10ths cloud cover enroute to target, about 3/10ths over the lagoon itself. The radiological danger sector radex through which no plane was to fly was forecast by Col. Robert L. Snider, air monitor, on the basis of latest wind data during the red time zone.

Flying crews who had definite instructions to be in bed by 2100 were almost the only persons on the island who caught any sleep that night. Lights blazed all over the field; intelligence officers held special briefings for visiting observers, mess halls remained open throughout the night, personal equipment offices fitted parachutes and Mae Wests to long queues of VIPs. "Where the Sam hill does this line begin," asked General Stillwell. Press rooms resounded to the clatter of rusty typewriters pounding out thousands of words of last minute copy, message centers and radio rooms gave forth with their own peculiar electronic cacophony. Throughout the arcade speculation was rife that the mission would even yet be postponed. But midnight the deadline for calling it off came and with it the word; it is still on. An hour later evacuation of Kwajalein began for those persons who were actively concerned with Able Day operations. This precaution was taken in order to reduce the possible number of casualties just in case something should happen to Dave's Dream and its lethal cargo during takeoff. Within two hours, hundreds of GIs, sailors, natives and red cross girls had been carried by boat to Ebeye Island. Maj. Harold Wood, the bombardier who in a few short hours would press the toggle switch releasing the Bikini bomb, turned off the alarm and walked sleepily to the adjoining tent of his boss—the pilot of Dave's Dream, Maj. Woodrow P. Swancutt.

"Hey, Woodie, out of the sack. Best we be on our way."

A quick breakfast for all the crews and a last-minute weather briefing at 0345. Weather was expected to be slightly better than that predicted the afternoon before. Then a final "good luck, guys" from their CO, Col. William H. ("Butch") Blanchard. And the crews headed for their planes.

Ground crews ran the first propellers through just as dawn began to break. By this time all those left on Kwajalein had come down to the flight line to watch take-off. Red-eyed from lack of sleep, they sat on fence rails and wondered what the next few hours would bring. And at 0415, exactly on schedule, they watched the first B-29—"The Atomizer" command plane carrying the Air Commander, Brig. Gen. T. S. Power, and Maj. Gen. Curtis E. Lemay—roll down the strip and head into the faintly greying dawn, with the kind of precision you could "hack" a watch by. One by one, eight other B-29s—F-13 photo planes—took off at exact 60 second intervals. Then came the blast-gauge bombers, the press photo plane—"The Eye," the broadcast plane—"The Voice," and the radiological reconnaissance aircraft.

AAF draftsmen make last minute briefing corrections for task group.

Dave's Dream was scheduled for take-off at 0533, but could not leave until final clearance was radioed from Admiral Blandy. In a radio room near the flight line, Brig. Gen. Roger M. Ramey, CG of Task Group 1.5 nervously puffing on one cigarette after another, impatiently counted off the minutes on his watch. Under just as great a strain was Col. Glenn Coleman, task group communications chief who stood by restlessly sweating out the first signal from any of four different circuits, including CW from the McKinley and telephone from the flagship to a ship in Kwajalein Harbor.

Take-off time came and still no word. "What the devil is the matter, Glenn?" asked the General. "See if you can get them again."

A radio operator tapped out the message, "Is takeoff authorized." The reply came, "Clearance not yet given." Five minutes, ten minutes, fifteen. Kwajalein kept calling. The suspense grew worse. Out in the bomb pit, crew members, armament men, ground crews, Col. Warner, Col. Blanchard, Col. Sutherland, and Lt. Col. Sam Nero, maintenance chief, were having a real "sweat session." They declared it was the worst 20 minutes of the whole show. The boys would sit down, stand up, pace the pit, sit down again . . . and the minutes dragged. Nobody knew why take-off was being delayed, no one dared express the common fear that the mission might be called off.

"Damn it, I can't go through another day like this last one," more than one person was heard to mutter. "What the hell gives." Actually, although they did not find out until much later, what "gave" was clouds over Bikini. The McKinley weather people were waiting until the situation looked more favorable. Meantime, everybody in the pit trained eyes on the General's car across the ramp. They would know the okay had come when the engine started up. At one point they could see fumes from the car's exhaust and spirits lifted, only to fall even lower than before when they realized it was a false alarm.

And then, first over the telephone monitor line, and a minute later over the teletype and CW came the word, "Bomb-carrier authorized to take off." General Ramey was out of the radio room almost before he heard the end of the sentence. Forgetting about the waiting car, he streaked across the runway on foot, a solitary figure in trim-fitting khaki flying suit. Radio notified "Dave's Dream" and it slowly left the ramp, turned, stopped to pick up the General, and headed toward the sea. Its wheels were above the runway at 0554. Just before it cleared the field, a rainbow appeared in the greying sky, framing the sleek silver bird beneath a ribboned arch of incredible beauty.

The symbolism of this coincidence motivated an almost universal reaction. "That does it," people seemed to feel, "everything is going to be all right now."

And it was. Gilda was airborne and doing fine. Crew members breathed a sigh of relief and then settled down to altering the flight plan on the basis of the 21-minute delay. However, a few minutes later, word was received from "Priest," the radio call sign of the McKinley, to proceed as planned with H-Hour moved up exactly a half-hour.

Weather was soupy, the plane was on instruments most of the way to Wotho Island. It kept the navigator, Major Bill Adams, busy guiding the bomb-carrier around thunderheads which showed up on the Radar scope. "Some of us were worried about the weather—and frankly dreaded the thought that we might have to bring Gilda home again," Adams reports. "But we finally broke out over Wotho and to use up the extra nine minutes we had with the moving up of H-Hour we flew a similar pattern over that island to that which we would fly over Bikini. We made some wind runs and Chenchar (Capt. Paul Chenchar, Radio Operator) and I made calculation of the time we would be over target on our live run. The prediction we made at 0740 turned out to be 30 seconds off."

Meanwhile, the bomb itself was coming in for more masculine attention than even its namesake had ever rated. The number one man responsible for Gilda's well-being until the actual drop was Colonel Sutherland, who has the distinction of being the AAF's first Bomb Commander. As such he is a liaison and supervisor between both the technical and operational aspects of Atom-bombing. Bomb commanders—several of whom are now in training for specialized jobs even newer than the A-bomb itself—must know not only the intricacies of the bomb's composition and how it works, but must also be familiar with the operation and tactics of the plane which carries it.

Carefully selected for this assignment on the basis of an outstanding bombardment record plus many years of work with the Norden bombsight, Colonel Sutherland was sent to New Mexico early in March and given a "Blitz" course on the theory of nuclear fission, assembly, functioning and testing of the bomb. Since then he lived, worked, and studied with the Los Alamos scientists and their bombs until at this point he felt that he could justly claim graduation from apprenticeship as an "Atom Chipper" to membership in the infinitely more exclusive society of "Atom Splitters."

Dealing with atomic bombs is a ticklish business at best and one which demands almost constant supervision. While the chances are slight that certain parts might malfunction and something go wrong, nobody wants to overlook even the most minor precaution. Working with the bomb carrier's Manhattan District "Weaponeers"—L. D. Smith and D. L. Anderson—who "armed" the bomb on the way to target, Colonel Sutherland made continual checks on the

Fritzy, 509th's Dachshund, only dog airborne on Able Day mission, is fitted with Mae West and chute before boarding blast-gauge plane.

bomb until the very last moment, "sort of listening to its heartbeat and taking its pulse," as he puts it.

About five minutes before bomb release, Colonel Sutherland made his last check and "performed the final operations" on KN-8, the task group's official designation for Gilda. And then over the intercom, "Bombardier from bomb commander. The bomb is ready to go."

By this time Dave's Dream had reached its orbit point, made one dry run, taken final drift readings, received the latest ballistic radar winds and was now on the live run itself. Almost 30,000 feet below the bomb carrier lay the Nevada and some 70 other Naval craft of all classes and types—motionless ghost ships waiting to be plunged into the strangest scientific experiment in history. Outside the Lagoon from 10 to 20 miles away, the Navy's supporting vessels, among them the McKinley, the Appalachian, Panamint, Blue Ridge, Saidor and many others were all tuned in to the bomb run commentary being broadcast from Dave's Dream by co-pilot Capt. William C. Harrison. Fifteen minutes to bomb release. Then 10 minutes. Five, and so on. Also listening in were 58 Army and Navy aircraft orbiting at specific points all the way from seven to 20 miles slant range from the target and waiting for the signals which would release blast gauge instruments and trip off automatic high speed cameras.

Not all the circling planes had pilots in them. Flying around crewless but nevertheless at their exact stations for entrance into the atomic cloud were three Navy drones, a fourth had gone out of control and spun in just before bomb release, and four Army radio controlled B-17s which had taken off earlier in the morning from Eniwetok to the thundering cheers of every soldier and sailor on the island. It was the first time in the history of aviation that a four-engined bomber had ever been put in the air with no one aboard. On previous remote control flights safety pilots had gone along to take over in case of radio failure. Now within a few minutes the world would know whether any planes could survive the terrible heat pressures and turbulence of an atomic explosion.

By the time Dave's Dream started its live run the gods again beamed on Operation Crossroads. "It was a funny thing really," relates navigator Adams. "On our first run clouds partially obscured the lagoon, but when we came around for the real thing there was the whole target array sitting right out in the open under less than two-tenths cloud cover, and that's better than any practice mission we've ever had; there were clouds all around the outside but there seemed to be a distinct hole right over the ships. Chenchar and I had our usual argument over the time it would take to put us to bomb release point and as is our custom we compromised. Chenchar calculated two minutes longer than I did, so we decided to split the difference and gave the dope to the pilot. Again we were lucky! We hit it within exactly 14 seconds of the briefed time for bomb release."

However well they may have camouflaged their inner feelings of excitement, or even fear, everyone aboard Dave's Dream appeared superficially at any rate to be as calm and casual about the whole thing as the plane's feline mascot, Kwaj.

On the live run itself the weaponeers with an unconscious display of classic irony were pouring over weird tales. And by their own confession the one thought uppermost in the minds of Jack Sutherland and Bill Adams in the moment before bomb drop, was not whether their bomb was going to upset the world's center of gravity or cause hundred-foot tidal waves, but simply how damned good it would be to smoke again as soon as they got rid of Gilda.

King Juda, whose people gave up an island for cause of science.

Drone Fortress, above, returns to Eniwetok from flight into cloud.

Below, on way to Bikini, Dr. R. M. Frye, Boston U., eats K ration.

With no time for even these contemplations Bombardier Wood was bent over his Norden sight. On the basis of the latest wind data given him by Adams and Chenchar, he adjusted his sight to correct for one degree left drift and added five mils of trail.

Sixty seconds before bomb release a tone signal was turned on which could be heard by all surface and aircraft in the operation and simultaneously Harrison voiced the final signal.

Immediately adopting the 'let's get the hell out of here' tactics, Swancutt banked 60 degrees and made a 150-degree turn in 35 seconds, practically a fighter plane maneuver. The plane had levelled off at 1,000 feet below bombing altitude and was headed straight away from the target when the shock wave struck.

"It was like a near burst of flak directly beneath the ship," reported Swancutt, "but there was no loss of control at any time. And no one was hurt except Jack Sutherland. He was bent over the drift meter watching the cloud when the shock wave hit and the lens cut his face just below the eye. He bled for a while and I guess he's been taking an awful ribbing ever since for being the one and only casualty in the entire air operation."

There have been as many descriptions of the explosion and the cloud which followed as there are persons who witnessed it. The cloud in particular has been likened unto everything from a bursting cotton ball to a monster tugging at the earth in an effort to lift it up and hurl it into space. Whatever the reaction, no one who saw it remained unimpressed. "It was the most horrible and most beautiful thing I have ever seen," said Lt. Dave Lowe of the photo unit. "With all its tremendous surge of power, it still retained an incredible grace and dignity," said Capt. Earl Michelsin of A-2. "It was an immense, turbulent half dome of white and orange," reported Col. Russel S. Leone, Task Group Surgeon. And from Dr. Karl T. Compton, President of the Massachusetts Institute of Technology, and a member of the Crossroads Evaluation Board for the Joint Chiefs of Staff, upon landing at Kwajalein after viewing the explosion aboard a C-54 at 7,000 feet, 20 miles east of target: "In addition to the goggles I wore, I had my arm over my eyes to keep out all light, and I missed everything until about one minute after burst. Then I saw the rising mushroom cloud beautifully. To my surprise, I felt absolutely no indication of the shock wave although I was looking for it at about the right time. I saw nothing of the target till three or four minutes later, since the target area was obscured by cloudy haze, perhaps from the explosion. When I did get a clear view, my first reaction was that the ships were all still there. I could see several fires. The Independence was burning and smoke was pouring from the stern of the Nevada. It seemed to me that a good many ships had been displaced in position by the pressure of the blast. Before we left, I saw one of the burning ships go down. At the far side of the Nagato I saw a large greenish-blue fluorescent region of the water. It was very striking. I supposed it to come from some quartermaster material blown off some ship.

"I believe one of the most majestic sights I ever saw," he continued, "was that of the drone planes going straight into the cloud and coming out again. It was magnificent. Everything seemed to be going like clockwork all during the operation and I should say that it was a highly successful mission."

The bomb had been dropped, the explosion and the cloud had reacted in the exact manner that the scientists had predicted, all four Army drones had been sent directly into the cloud and emerged intact, the desired photographs and instrument recordings had been obtained, mission was accomplished and now the planes were heading home in triumph.

First to land was Dave's Dream, guided to a special berth of honor directly in front of headquarters. Returned from the evacuation to Ebeye, Kwajalein's populace sent up a rousing cheer. Swancutt crawled down from the bomber, a slim, prematurely gray young man of classic features, and warmly greeted his crew chief M/Sgt John Garlinger who was almost speechless with emotion. Press, radio and newsreel men swarmed around crew members as they descended from the superfort.

"It was a good mission," said Swancutt.

"We had one of the best bombing runs we've ever had," said Wood.

"The mission went off precisely as briefed," said General Ramey.

"I agree with Wood that it appeared to be the best bombing run we've made."

Dave's Dream, atom bombing B-29, rolls to a stop after epochal flight over Bikini. Pilot's first greeting was to Crew Chief Garlinger.

One by one the planes returned—one by one the reports were the same. From photo, "The mission was as nearly perfect as this man's Air Force will see for a long time." From operations, "Every plane was exactly where it was supposed to be—and at exactly the right instant. If you had taken model airplanes and put them on the planning table you couldn't have done a better job." From the Radiological monitors, "The radex turned out to be almost where it had been predicted.

Three hundred miles to the north Eniwetok was having a welcome-home celebration of its own. Crowds lined the runway to watch the return of the phantom fortresses, some of them "white hot" was radioactivity. Babe number 1 came in, crabbed slightly as it hit the runway, finally rolled to a slithering stop. Geiger counter in hand, a radiological monitor approached the drone. Faster came the clicks betraying the presence of alpha, beta and gamma rays. This plane had really had it! No one was allowed to approach the plane except those crew members who rushed forward and quickly pulled controls which shut off the engines and released the bomb bay bags which had collected samples of contaminated air while passing through the atomic cloud. The second babe came in for landing.

They had pulled it off. It was a real victory for Colonel Harvey Alness of the instrumentation unit and for the babes themselves. All four fortresses had gone straight into the cloud at altitudes ranging from 13,000 to 30,000 feet. All four had emerged, flown home and landed intact. The elation of the Eniwetok boys knew no bounds.

As soon as they were removed from the planes the radioactive "air-sample" bags were placed aboard C-54s and flown to Kwajalein for analysis of chemical properties. Cages of white rats—the only passengers of the drones—were returned to the USS Burleson, Joint Task Force One animal ship, for study concerning the effects of radio activity on living tissue. Bacterial smears, which also had been placed aboard the drones, were flown back to the states for laboratory study.

Over Bikini, planes were still flying—"cloud chasers" tracking the movement of the deadly radioactive cloud until it dissipated. Position of the cloud was periodically radioed to the radiological controls center on the USS Haven where radioactive masses were being mapped.

That same Able Evening, two other B-29s ventured forth on one of the most dangerous missions in the whole crossroads operation. Their job was to search out, in dark of night, the by-now invisible but nonetheless lethal radioactive area and collect samples of whatever material was to be encountered there by means of "precipitrons" connected with the plane's ventilating system. Leaving Kwajalein, the two superforts piloted by Maj. Claude R. Eatherly and Maj. Allen B. Rowlett proceeded to an area north of Bikini where they were vectored by radio to the predicted location of the Atomic Cloud by the CIC (Combat Information Center) control room on the McKinley.

About 2100 the Geiger counters on both planes began to click furiously, and the air monitors—Lt. Col. J. M. Talbot and Lt. Col. Scott M. Smith—notified the pilots, and crew members were ordered on oxygen. For 80 minutes both planes were in radioactive regions, for 20 minutes in the cloud itself, in such a way that the precipitrons, which were operating constantly, could collect the desired amount of radioactive material.

"My Geiger counter was clicking so fast," said Colonel Smith, "it sounded just like a rattlesnake ready to strike—and it had precisely the same effect on my central nervous system."

Later examination of radiation-measuring instruments aboard each plane showed that although both B-29s had passed through the cloud no crew member had received more than the maximum safe exposure.

Swancutt and Wood

With the return of the precipitron planes air operations for Able Day itself had come to a successful end. It had been a memorable day. But throughout the island there could be sensed a rather general feeling of disappointment, sometimes voiced, often merely felt. The explosion itself was less spectacular than many had expected—and the fleet was still afloat.

By day's end four ships had been sunk, several others left burning and heavily damaged. But in spite of the official emphasis, ever since Crossroads was first planned, that the Bikini experiment was in no sense a test against the Navy, there persisted the popular idea, however unreliably based, that the bomb had been rather considerably oversold. Consequently, there were many hasty conclusions drawn—both in and out of print—on the basis of pre-fixed ideas.

Looking back on it, there seem to be two or three reasons why the general reaction to the results of the day's work was one of anticlimax. First, unless the average person, even in the AAF, were working very closely with the A-bomb people, he quite naturally built up preconceived expectations of what the bomb would do from the statements of unreliable scientists, the speculations of writers, or his own vivid, if unscientific imagination. Secondly, most of these observers who returned from the Able Mission with a letdown feeling were flying many miles from the target when the blast occurred and consequently any assessment of damage to ships in the lagoon necessarily had to be made from an altitude of several thousand feet. Finally, it was too early for anyone to know the results of what might turn out to be the bomb's most potent element of destruction—its radioactive effect on living creatures.

Actually, what the scientists in top standing—such as

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ATOMIC 'Minute Men'

Their job is something new under the Sun: keeping tabs on a deadly emanation which cannot be seen or touched

BY CAPT. JOHN P. MERRILL

Group Surgeon, 509th Composite (Atom-Bombing) Group Operation Crossroads

"Hot" B-29 engine is tested with Geiger by Col. R. L. Snider.

Some three hours after the first atomic bomb burst over Bikini a C-54, specially modified for photography, rolled to a stop outside Task Group 1.5 operations at Kwajalein. The crew and photographers debarked but remained grouped around their aircraft. Spectators and ground crew were waved away. Reason: somewhere over the target area the plane had run into part of the invisible cloud of radioactive particles emitted in the white-hot moment of fission when the bomb exploded. The activity was neither tangible nor visible, nor was it felt by any of the personnel inside the plane. But the sensitive instruments of the Radiological Monitors had betrayed their presence and it was time to stop and tread carefully.

A moment later an ambulance drew up beside the plane and a medical officer still in his flying clothes jumped out and began a careful survey of the engines with a small metal box to which was attached a headset. Two other flight surgeons lined up the crew and passengers and began swabbing their nostrils, carefully depositing the swabs in paper containers labeled with the name, rank and position in plane of each man.

This strange procedure was all part of a carefully thought out safety plan for Operation Crossroads, a plan developed and carried out by the Radiological Safety Section, under the direction of Col. Stafford Warren, M. C. The nasal swabs were to be rushed to the headquarters of this section on the hospital ship, the USS Haven, then lying off Bikini lagoon, where they would be carefully checked for radioactive particles which might have been inhaled by the passengers. The small metal box passed along the engines was a portable Geiger counter, an instrument which detects even minute amounts of radioactivity and is familiar as the instrument used in locating tiny bits of misplaced radium in hospitals. In its earpieces each radioactive particle causes a series of distinctive clicks and the amount is recorded on a dial on the instrument's face.

When an atomic bomb explodes, the tremendous forces of heat, light, and blast are vivid warnings that their dangers must be dealt with and personnel protected against them by distance and shielding. More subtle, but no less dangerous, are the forces of the radioactive cloud which billows up. The visible cloud is obvious, and around it lurks an invisible danger area which must be accounted for, and which can be dealt with only by trained men equipped with sensitive detecting devices. These men were in the air over Bikini on A-day in the planes of Task Group 1.5 and the Navy PBMs. As Air Monitors they were assigned the many-fold tasks of preventing the exposure of crew and cameramen to dangerous amounts of radioactivity, of tracking the shifting atomic cloud, and finally, of specialized data gathering on precipitron missions in which the planes actually sought the active areas after darkness had fallen on Able might.

As a group, Air Monitors are as new as the "A" bomb itself. And as is the case with so many other highly specialized tasks connected with this unique Crossroads experiment, their jobs were born of actual necessity.

In the first place, nuclear fission, the basis for atomic detonation, is accomplished by complex and as yet inadequately understood phenomena. Military have a pretty concrete understanding of the explosive force involved, but the radiological phenomena were something else again. Invisible, intangible, these forces are reported to have accounted for hundreds of insidious, delayed deaths in the two previous explosions over Japan. To what exact extent these reports have been medically substantiated has never been accurately determined as yet, but even so, Joint Task Force commanders entrusted with Crossroads operation were determined to take no chances with the life or health of any of the 42-thousand men involved in the greatest naval and military maneuver in history. So they gave to Col. Warren's Radiological Safety Sections one of the greatest responsibilities in the entire Crossroads operation: (1) The protection of all air crews and water-borne personnel grouped around the target area on both the Able and Baker atomic tests in Bikini lagoon. (2) The collection of radiological data pertinent to future "A" bomb protective measures.

Within his group, Colonel Warren designated 30 officers and enlisted men to form the Air Monitors section and entrusted them with the express purpose of "monitoring" the air phase of the operation.

Air monitors for Kwajalein-based aircraft, back row: Capt. W. N. Sullivan, Lt. Col. G. W. Neece, Lt. Col. J. F. McDonough, Col. R. S. Leone, Lt. Col. J. M. Talbot, Maj. J. A. Comstock, Pvt. G. E. Alton. Front row: Lt. Col. S. M. Smith, Pvt. G. Armitage, Lt. S. E. Krasnow, Capt. J. P. Merrill, Capt. H. E. Coulter, Lt. (USNR) J. Turner. These men detected radioactivity for AAF crews.

Specifically, their responsibility included the provision for safety of all tactical aircraft, press, broadcasting, and observation planes, as well as the aircraft involved in the "cloud-chasing" and precipitron missions. In addition, routines were established for safety procedures in case of crash of the bomb carrier, and for the monitoring of planes which had returned from possible danger areas—chiefly the remote controlled, pilotless "drone" aircraft which were to fly directly through the atomic cloud and collect samples of radioactive material.

The Air Monitors had their first contact with simulated Able Day conditions in March and April when they flew practice flights over the first "A" bomb crater in New Mexico. Many of the group were flight surgeons, but others were drawn from associated specialties and required actual air indoctrination with their instruments. Since the bomb crater still retained enough radioactivity to give a decided kick to the sensitive counters, buzzing it gave an excellent approximation of what might happen over the Pacific if their planes moved too close to a danger area. The first flights were set up in five L-5s, piloted, incidentally, by P-51 pilots, whose landings were said to be something out of this world. Approaching in tight formation they would peel off and land with all the precision, (but somewhat less airspeed) of a hot fighter outfit. Later, and purely for greater convenience, the indoctrination missions were flown in a C-47, which could be based at Roswell, 40 minutes away by air.

Col. Russell Leone, M. C., Surgeon for Task Group 1.5, played a large role in setting up these first missions. "Our procedure was to make a pass over the area at about 1000 feet, and recross the area 300 feet lower each time to demonstrate the effect on the instruments of increasing proximity to the target," he said. "Our last pass was right down on the deck, and the counters would really scream, as did an occasional monitor who felt he might stub his toe on radioactive sand." Colonel Leone and Captain Harold Coulter left by air in April to join the medical section of Task Group 1.5 on Kwajalein. The rest of the air monitors made the trip on the USS Haven, headquarters ship for Radiological Safety, arriving in the Marshalls in mid-June. Part of the group was then dispatched to Eniwetok to be attached to Col. Harvey Alness' drone unit, while a few went to Ebye Island to fly in the Navy PBMs stationed at the seaplane base there. Here the monitors began the serious business of familiarizing themselves with the actual planes and routines which they would use on the day of the drop.

To understand some of the problems confronting this group, let us review for a moment what it was predicted would happen over Bikini on the day of the explosion. The first evidence of fission would be a tremendous burst of light, strong enough even at 15 miles to cause blindness for as long as one or two minutes. Closer than this, direct observation of the flash might cause permanent damage to the sensitive recording film of the eye, the retina. Lack of caution or protection might cause temporary lack of vision to the pilot. The cameramen in the F-13 (photo B-29s) whose mission required that they visually direct their cameras at the aiming point ran into a problem here, as some of their high speed cameras consumed their entire roll of film in less than ten seconds, and thus had to be focused up to the last possible moment. These problems were met by the use of a special welder-type goggle, carefully inspected by the monitors for light leaks. Crew members were directed to wear the goggles and look away from the target area. Once the initial flash had occurred, the time taken to remove the goggles would be adequate to insure the eyes against harm from looking directly at the developing cloud. This measure was so important that the direction for placing the goggles on forehead and over eyes was included in the live run commentary from the bomb-carrying plane itself.

With the splitting of the plutonium atom tremendous amounts of heat would be released, but at the distance at which the aircraft would fly—on an average of 12 to 15 miles away—this would not be a dangerous factor. Of

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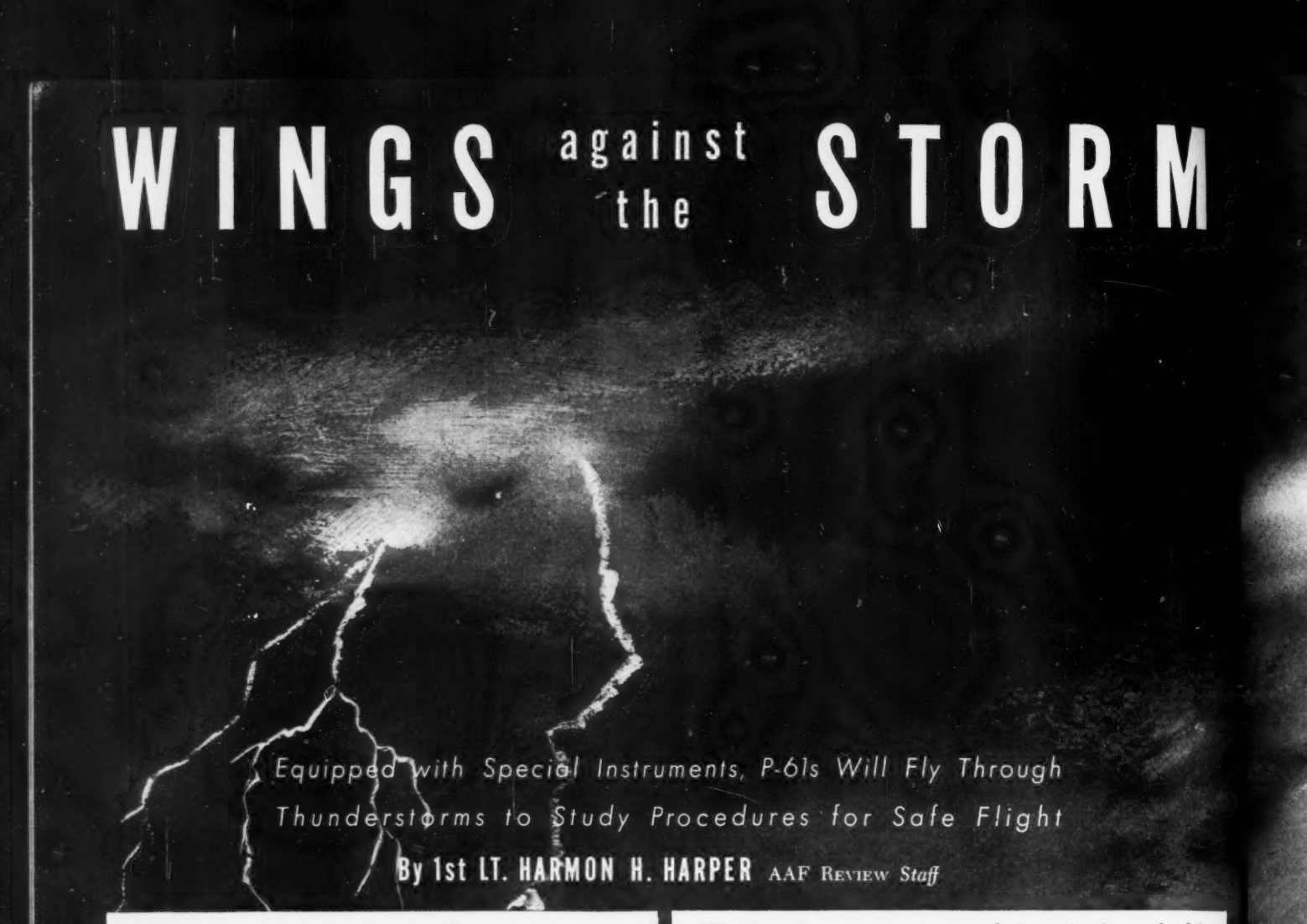
WINGS against the STORM



Equipped with Special Instruments, P-61s Will Fly Through Thunderstorms to Study Procedures for Safe Flight

By 1st LT. HARMON H. HARPER AAF REVIEW *Staff*

"How do you fly a thunderstorm?"

If that question were asked a representative group of pilots they would probably reply with the only uniformly accepted rule at present.

"Avoid it if possible. If you can't avoid it then pray and pray hard."

At the moment perhaps that is the best advice but a special investigation is currently in progress at Pinecastle Army Air Base, Orlando, Fla., to crack the case of the thunderstorm. Here the latest testing devices have been assembled under the supervision of specialists from the AAF, Navy and civilian agencies to develop scientific procedures for flying thunderstorms, thereby reducing the hazards.

To aviation, military and commercial, the thunderstorm ranks with ice and fog as one of the three major weather hazards. The thunderstorm constitutes a real danger because in it may lie areas of violent turbulence that will bend dihedrals; lightning that will disrupt radio communications and force the pilot to navigate by dead reckoning; hail, ice, freezing rain or super-cooled water droplets that produce ice formations.

Although pilots have long known the dangers of flying through thunderstorms, and AAF, Navy, civil and commercial pilots have flown through them, no detailed and comprehensive quantitative data have been compiled on their structure and exact nature. Since thunderstorms have remained relatively unknown quantities, it has been impossible to formulate scientific procedures for flying them. Instead, varying hit-or-miss rules have been developed, based on the qualitative judgment of the aircrew.

To promote flight safety through thunderstorms, Congress in 1945 allocated $267,000 to the United States Weather Bureau for a special investigation of this weather hazard. The Weather Bureau appointed Prof. Horace Byers, Department of Meteorology, University of Chicago, as technical supervisor of the project. Specialists and equipment of the AAF, Navy, National Advisory Council for Aeronautics and the Soaring Society of America have been enlisted to study the problems from all standpoints in an attempt to find a practical solution.

The initial investigations are being conducted in Central Florida under the technical direction of Professor Byers and the general supervision of the AAF Board. This area was chosen as the site for Phase I in the program because of the many intense, convective-type thunderstorms originating there and the availability of a powerful AAF MEW radar that will be used to detect approaching storms and track aircraft in their flights through them.

Investigative methods of the thunderstorm project are designed to obtain certain basic results that will furnish a scientific foundation for developing equipment and procedures for the safe navigation or circumnavigation of thunderstorms. Particularly, the investigators plan to secure information that will form a basis for:

- Recommending instrumentation and flying procedures for radar and non-radar-equipped aircraft so that hazardous conditions can be avoided.
- A means of determining where and under what conditions thunderstorms present a hazard to flying, i.e., the identification of zones of maximum or excessive turbulence and vertical currents; the magnitude and effects of the forces they apply to the aircraft; the principal zones of precipitation static and lightning and conditions under which hail or ice will form.
- Establishing a method to determine or locate these

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flying hazards; this includes the interpretation of radar echoes as indications of weather dangers.

- Formulating a description of a thunderstorm from a research standpoint by studying it throughout its life cycle.

To obtain these basic results ground observations have been combined with serial flights. The test area, covering approximately 75 square miles contains 58 observation stations. This is the greatest station density—one for every two miles—ever used on an area of its size in the United States. These stations are organized in a micro-network and equipped with automatic recording instruments arranged in the most suitable combination of Army, Navy and civilian meteorological equipment.

Installed within the stations will be such instruments as the recording microbargraph which is usually sensitive to minor pressure changes, the hygrothermograph which utilizes a hair to determine relative humidity, and special Weather Bureau and Navy anemometers and wind vanes. Rawin and Rawin-sondes are to be used for making upper-air observations with balloons. Rawin equipment makes it possible to track freely-rising balloons with radar, and from the motion of the balloon in three dimensions to determine horizontal and vertical wind velocities. The rawin-sonde is an instrument for tracking balloons by radio and determining wind direction and velocity. This balloon also carries instruments that send out signals indicating relative humidity, pressure and temperature. Weather Bureau gust recorders will be used to measure maximum momentary wind velocities.

Radar will have a special part in the thunderstorm tests. Four SCR-584 sets will be used to determine winds and the SCR-517 AN/APQ-13, AN/APS-1, and AN/CPS-4 will be used for cloud study and aircraft control. Aircraft will be equipped with AN/APX-6 Mark V IFF equipment for radar location in clouds as well as for an associate project being run in conjuction with the tests to determine the suitability of this equipment for ground control purposes.

To make in-flight observations of the thunderstorms, the AAF has provided nine P-61C's. The P-61 was chosen for the aerial tests because of its low stalling speed of 85 mph with wheels and flaps down, its ability to carry the necessary equipment and to withstand forces up to 10 G's—ten times the pull of gravity.

The P-61's will be equipped with special instruments, furnished by the AAF, Navy, NACA and Massachusetts Institute of Technology to take aerial data from the storms. An airspeed-altimeter supplied by NACA will measure turbulence and gusts, and three component accelerometers will measure the effect of turbulence and gusts on aircraft structure. Other NACA instruments will measure the spanwise pressure on the structure of the aircraft and give the positions of and forces on the control surfaces. Since atmospheric turbulence of sufficient intensity to cause load application in excess of design values may cause the pilot to lose control of the plane, the measure of turbulence is a necessary requirement in formulating rules and procedures for safe flight techniques.

Navy electrical field recorders have been installed jointly by the AAF and Navy to measure the electric potential of the atmosphere. These instruments measure the electrostatic fields, indicating their magnitude and polarities. Information of this nature will be used for research on lightning discharges, corona displays and radio static. MIT drop-size recorders are used to determine the size of precipitation particles, and a water-content recorder gives the cloud water content.

An AAF altimeter will measure the absolute altitude of the aircraft and an AAF acrograph will record temperature, pressure and relative humidity of the atmosphere. The P-61s will also carry the commonly installed SCR-720 radar set plus a recording camera to preserve data for scope interpretation of clouds. An NACA synchronizer will assure simultaneous timing of the various automatic recording instruments.

Additional cameras will be carried to photograph the control panel so that it will be possible to determine what the control settings were at any time during flight. The motion picture records of instrument panels and the records of control positions will be used to determine the disturbed attitudes of the plane resulting from turbulence and the magnitude of corrective control motions applied by pilots. Photographs will also be made of the cloud as the planes approach the thunderstorm. At the ground stations, photographs will be made of the MEW radar scope showing the radar echoes obtained from falling rain, large water droplets in the clouds and the location of the planes flying through the thunderstorm. Continuous time-lapse motion pictures of the storm clouds will be recorded from two watch towers located at strategic points in the test area.

For the first time in the United States gliders will be subjected to the severe gust loads imposed on fast flying aircraft. Members of the Soaring Society of America will fly three Pratt-Read TG-52 gliders for the project. The TG-52 is of metal and wood structure, the wings being principally wood, with a 54-foot wing span and an overall weight of 1,150 pounds. The flying speed of the TG-52 is 50 mph but they have been equipped with dive spoilers so they can descend rapidly in a thunderstorm without building up excessive airspeed. The TG-52 is normally a two-place glider, but it will carry only one occupant for the thunderstorm tests. The additional weight will be taken up by instruments.

Besides the standard instruments for air speed, altitude and temperature, the gliders will carry sensitive and standard rate-of-climb indicators, an angle of attack indicator, baragraph with accelerometer and a G/A accelerometer. The barograph and accelerometer are self-recording either on smoked glass or drum cards. All other instruments will be photographed by 16 MM. motion picture cameras. Each glider will also carry VHF equipment for communication with ground control stations.

The gliders will be equipped with Navy RT-35 transponders triggered by the Navy Mark IV shipboard radar set. Using this system the gliders will be tracked by the radar stations and a record of their track through the storm correlated with the recorded data collected by their instruments. By this method it will be possible to determine the positions inside the thunderstorm at which corresponding data was collected.

The gliders will carry oxygen equipment since they are likely to attain altitudes of 30,000 to 40,000 feet. These craft will attempt to find the area of sustained upward vertical currents and explore the limits of this area. Since they are capable of following an up-draft while remaining within the area of rising air, measurements of magnitude can be made. It is expected they will meet with the maximum amount of turbulence here. Special thermocouple instruments will measure the temperature gradient from wing tip to wing tip.

The use of drone planes in and around thunderstorms is operationally feasible and the Navy expects to furnish four F6F drones, two Navy control planes and one JRB control plane later in the summer. Instrumentation of these planes is not complete but it is likely that they will

(Continued on Page 48)

OPERATION BLACKOUT

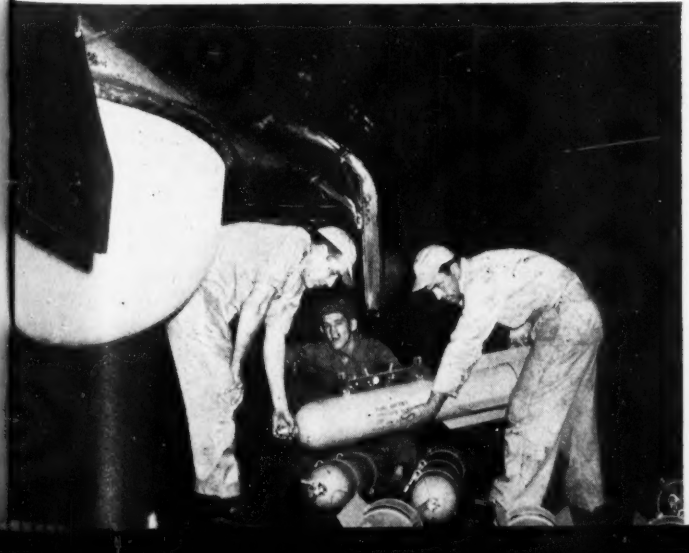
One fighting Air Force outfit that could go to combat this week if somebody got rowdy with Uncle Sam is the 47th Light Bombardment Group, the Night Attack "glamour group" now winding up a rigorous night operations program in jet-black A-26s under the Tactical Air Command.

"We could put a powerful striking force in the air on short notice," Col. Robert J. Hughey, Group CO, states with quiet confidence.

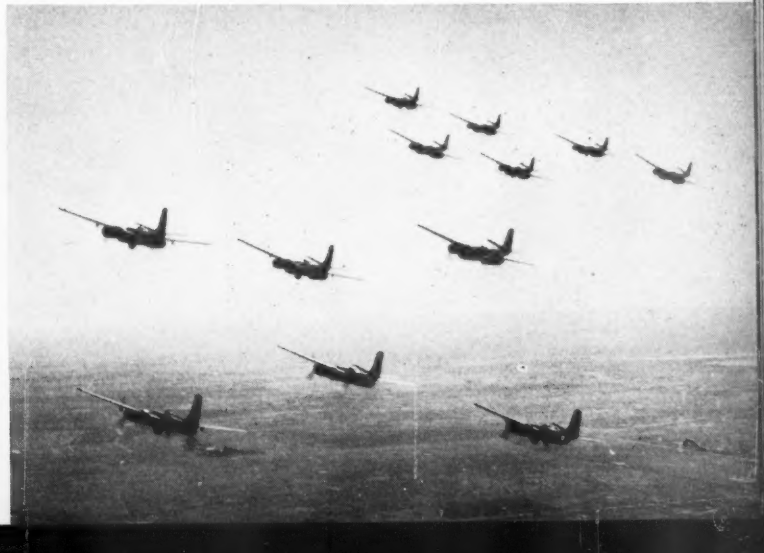
Together with its complementary organization, the 544th Air Service Group, the 47th is independent of any fixed base and can be moved as a complete fighting unit to an operating base anywhere. Manned entirely by Regular Army enlisted men and Regular Army and Category I and II officers when the night attack operational orders were received from Air Force Headquarters in March, the group went immediately into training at its present base at Lake Charles, La., to meet the requirements of the new order. These orders called for the group to reach and maintain a point of efficiency where they could find at night any pinpoint target within operating range, light it with flares and marker bombs and knock it out, all this in both favorable and adverse weather conditions. To assist the 47th in filling this large order, Col. W. W. Aring, command pilot who flew with 319th Bomb Group in the Mediterranean until he was shot down and made a German prisoner, was placed in command of the 544th Air Service Group. Colonel Hughey, veteran of the Pacific and the ETO, and Colonel Aring direct the combined operations of the two groups as one unit.

When the European war ended, the 47th was immediately re-deployed to the States to reorganize and train for combat in the Pacific. During the summer of 1945 the group had top priority for obtaining supplies and personnel. Assigned to the First Air Force, the group was authorized to visit all bases of that command and hand-pick aircrews and specialists. Selection standards were very high. Pilots had to have a minimum of 1000 hours with 200 hours of A-26 time and 100 hours of night time. In addition, they had to be desirous of overseas duty, have all efficiency ratings

Highly trained crew members of the 47th load up an A-26 in preparation for a night practice mission.



Jet-black A-26s manned entirely by Regular Army personnel are shown winging their way to night operation.



of excellent or better and had to be recommended volunteers for the regular army.

When the Pacific war ended before the 47th could be deployed to that theater, it was designated as a permanent unit of the post war air force and ordered to complete organization to T. O. strength. As original plans had called for the group to be a pathfinder outfit the blackout A-26s were brought in and training started along those lines.

Because it was one of the few outfits operating at full capacity during the rush of separation immediately following the close of the war, the group became more and more in demand for all sorts of jobs. Air cover missions were flown for ground forces in training. Medium and low level bombing, strafing and glide bombing were added to the night and radar missions and the group strike formations already being flown. In addition to its other duties the group has flown more then 30 air demonstration missions since April.

Part of the night attack glamour group of the Tactical Air Command on one of its rigorous training missions.

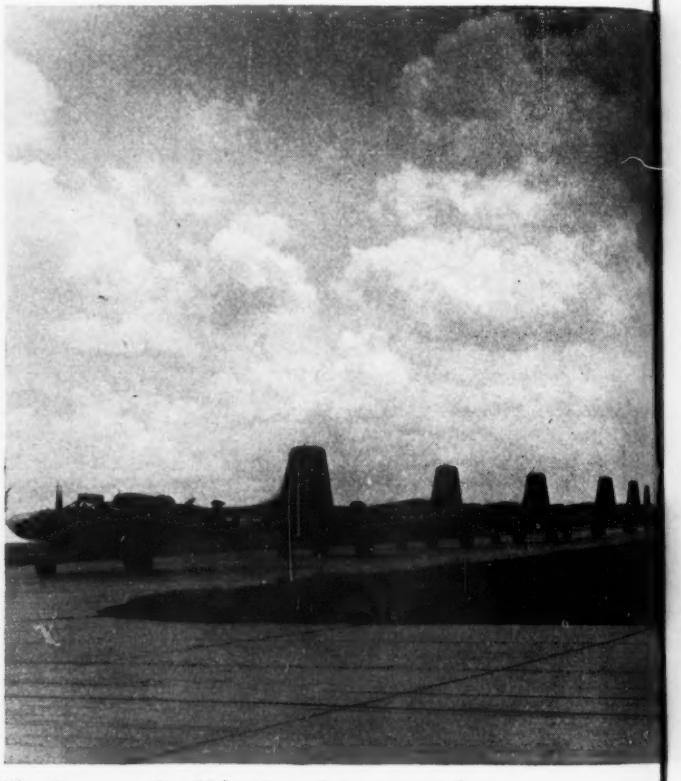
Evidence of the high operational performance of the 47th is the amount of flying time it piles up per month. During the month of April 73 pilots flew a total of 3,798 hours on all types of missions for an average of more than 52 hours per pilot. A look at the Form 5's shows that the average total flying time of first pilots is between 1,600 and 1,700 hours with 400 hours A-26 time average per pilot. This experience level is augmented by the fact that almost all the airplane commanders flew combat tours in one or more theaters.

The sleek, black A-26s assigned to the 47th were specially modified for the group. Two types of radar are installed to make the planes effective in any type weather on any type mission. The aircrews are all commissioned personnel, consisting of pilot, co-pilot (a recent addition to the A-26), bombardier-navigator and radar observer. The planes in which the group was to have fought against the Japs would have had the new 2400 horsepower engines instead of the conventional 2000 horsepower Pratt and Whitney's plus additional radar and warning equipment.

Crew training in the 47th has included all types of training with all combinations of facilities. Co-pilots are required to maintain exactly the same proficiency standards as first pilots. The group has devised a number of new procedures and methods for lighting and attacking night targets and has inaugurated several new target approach procedures for large formation strike missions.

Split second timing is necessary for the flare planes, marker bomb planes and the bombing force to descend upon the target, lay their eggs and get away all in a short period. The bomb dropping planes come in on the target in trail only a few seconds apart.

If half a moon or more is shining, the group runs its missions without the aid of a flare force, thus increasing the number of bombing planes and providing a stronger striking force.



Lined up on the flight line of its present base at Lake Charles, La., A-26s of the 47th wait in readiness.

Major inspections and repairs on the A-26s of the bomb group are done by the 544th which handles all second and third echelon maintenance. Personnel of the Air Service Group, numbering about twice the men of the bomb group, are largely recruited from the ranks of volunteers for duty with the bomb group and are all Regular Army. Under the separate commands of the bomb and service groups, all personnel work together as one unit to accomplish their operational mission.

For the present the 47th Bomb Group will continue to be part of the continental forces under the Tactical Air Command. Next on the operational list for the organization is an extensive program of all-weather operations to be conducted in conjunction with the Proving Ground Command at Orlando, Fla.—*Lt. Hal Basham.* ☆

on watch over JAPAN

The combat proven 5th Air Force now polices the skies over Japan.

Nagoya, Japan

A new era is dawning in the Land of the Rising Sun. With the war lords defeated and the military prowess of Nippon a memory, the big job of operating and policing the five home islands of Japan and Korea has fallen to the American occupation task force. The air arm of this task force is the reorganized 5th Air Force. In spite of the difficulties brought on by the redeployment at the end of the war of many veterans of its long island campaign from New Guinea to Japan, the 5th has emerged today as a competent aerial police force guarding the skies over the Japanese homeland. Around a nucleus of veteran members of the 5th Air Force, Maj. Gen. K. B. Wolfe, CG. has built an efficient organization. Personnel has been augmented by replacements from the United States. Also, low point men of the Sixth Army, including many infantrymen, were transferred into the Air Force for training in aircraft upkeep and air base duties.

To replace experienced personnel lost through separation, the 5th instituted on-the-job training for ground jobs and launched a flying training program to familiarize aircrews with new aircraft which were assigned to the force when it took over complete air occupation of Japan. Pilots of the 5th are undergoing transition training in P-51s, A-26s and new C-54 Skymasters in addition to the P-47s, P-38s and C-47s already familiar to them.

Crew chiefs, engineers, radio operators and gunners are being recruited from administrative and technical jobs to learn aircrew duties on the job. A mechanics school to

The flag which flew over Pearl Harbor is now raised in Japan.

Japanese watch a 5th Air Force military review in the rain.

Parachute riggers aid in maintaining the self-sufficiency of the 5th Air Force in Japan. Qualified men in inspection and maintenance are in the "few and far between" category.

Former 77th Infantryman transferred to the 5th Air Force is trained on the job as a mechanic. Many men transferred from the Infantry are now skilled Air Force personnel.

Maj. Gen. K. B. Wolfe, Commanding General of the 5th Air Force.

supply trained maintenance personnel has been opened. Many of the 1,700 civilians requisitioned through PACUSA are arriving to supplement the military personnel.

Aviation engineers of the 5th, veterans of many jungle airstrip projects, have made extensive improvements on the second-rate airfields built by the Japanese, bringing them up to AAF standards for use by our planes. Permanent rehabilitation of all potential Class A fields is still underway.

On the lighter side the 5th is sparing no effort to make things pleasant for occupation troops. Pilots landing for the first time at Kimpo Airdrome at Seoul, Korea, for instance, are frequently astonished to see ball games in progress on diamonds laid out between runways. Several bases have their own swimming pools, and those near metropolitan areas have requisitioned Japanese pools. Some of the bases have taken over and are operating Japanese golf courses, and the 5th is participating in golf tournaments throughout the Empire.

Stations occupying metropolitan areas use local movie houses, some of which are comparable to Stateside theaters, for troop entertainment centers. Enterprising groups at various bases have built enlisted men's clubs using abandoned Japanese construction material.

It was announced recently that arrangements are being completed to accommodate dependents of 5th Air Force personnel. Families will be provided temporary quarters at most air bases and later permanent housing facilities are expected to be available.—*Capt. Robert P. Whitten PRO 5th Air Force.* ☆

Recreation is not neglected here. A radar mechanic is served doughnuts and coffee at Tachikawa AAB by kimona clad girl.

Streamlined Supply

BY LT. COL. MICHAEL T. McLEAN,
HQ, AAF

Field-tested Methods Save Dollars for AAF

Supply officers of the AAF will think the millennium has arrived when they receive the new supply manual which standardizes and integrates supply procedures at Army Air Bases. No longer will personnel be in doubt about going to the Air Corps Supply Officer or the Quartermaster Supply when in need of equipment. In the past, it was a toss-up who was the proper authority. More often than not, the wrong office was visited first and, because most AAF installations are spread out, the supply-seeker had a long trek before reaching the proper authority. This placed him in a confused state of mind that often led to squabbles when he finally met with the supply officer's representatives. To repeat the tongue-worn expression, "those days are gone forever."

In August 1944, Headquarters AAF authorized the field testing of integrated base supply procedures at AAF Tactical Center, Orlando, Fla. Concurrently the Second and Fourth Air Forces, on their own initiative, successfully tested integrated supply procedures.

Careful evaluation of the results of these field tests revealed substantial savings in manpower and more expeditious and efficient services to tactical commanders.

Headquarters AAF, acting on the recommendations of Air Materiel Command and on reports of successful field tests, prepared a supply manual standardizing and integrating supply procedures at Army Air Bases for the supplies of the various technical services and the AAF. The manual, published April 1, 1946 with the concurrence of the Army Ground Forces and Army Service Forces, was prepared as War Department Technical Manual TM 38-410.

The total number of supply accounting forms commonly used by the base accountable supply officer have been reduced to 23, a saving of over $800,000 annually for the AAF! Identical supply procedures for all supply agencies on the bases and maximum centralization of supply activities, consistent with efficient supply operation, mean that the greatest utilization of supply personnel is accomplished as well as a substantial saving in manpower. Under the new procedures supply personnel may be readily shifted from one section of the account to another during the peak workload without fear of jeopardizing the accuracy of the account or suffering lost man-hours because of requirements for additional training.

In short, personnel as well as procedures are integrated. The procedures in TM 38-410 are predicated on a functionalized, integrated base supply organization. The terms Air Corps Supply Officer and Quartermaster Supply Officer are not used because they no longer exist. Accountability for all supplies of the various arms and services, as provided in AAF Regulation 65-2, is vested in one accountable officer designated by the base commanding officer

The supply procedures of TM 38-410 are effective when the manual is received, and they apply to all AAF bases and installations under the jurisdiction of overseas commands which are instructed to maintain formal records of supplies on stock record accounts. Although these procedures will not generally apply to AAF supplies at Air Depots or Specialized Depots and supplies furnished to contractors under other provisions, AMC may use as many of these procedures as are practicable at their installations. The new system, however, will apply to supplies received from ASF sources and furnished for the direct supply of troops attached to Air and Specialized Depots which repair and maintain those supplies. The procedures will also apply to AAF supply of Air Force activities located at stations not separately organized as Class III installations.

The procedures prescribed in TM 38-410 have been designed to eliminate unnecessary work, to effect maximum utilization of available personnel and to eliminate the requirement for personnel for non-essential tasks, consistent with efficient property accounting and adequate protection of War Department property. This is of particular importance in the postwar Air Force when the popular trend is to curtail costs and reduce personnel.

If, in the practical application of the procedures, a supply officer finds that it is necessary to increase personnel to do the job, or discovers duplication of effort, he should carefully review the procedures to determine whether his interpretation has been correct. If he determines that present accounting is sufficient and that new procedures require additional unnecessary work, he should notify Headquarters AAF through command channels. He should cite procedures in question and indicate the exact language he wishes to recommend. Recommendations should be addressed to Commanding General, Army Air Force, Attention AFDBS-4.

Several new procedures have been introduced in the manual. A Reparable Part Exchange Tag (WD AAF Form 50A) has been designed to reduce paper work for maintenance personnel and to facilitate the exchange of reparable parts for serviceable ones. Full advantage is taken of AAF combined maintenance facilities by requiring all reparable supplies, both AAF and technical services, to be processed through a common Production Control so that unserviceable supplies may be efficiently returned to serviceable supply channels. A new memorandum receipt procedure is introduced which eliminates the requirement for Memorandum Receipt Abstract, and provides in detail procedures necessary to effect a transfer of memorandum receipt property from one responsible officer to another The elimination of the Memorandum Receipt Abstract is a definite man-power savings. The number of man-hours saved are in direct proportion to the number of personnel released from this task. The field test on this procedure, conducted under wartime conditions, revealed an estimated saving of 40,000 valuable man-hours per month in the command conducting the test. ☆

Everyone is happy now under the new simplified supply set-up.

THE AAF IN REVIEW

Army Air Force Wins "Oscar"

The AAF motion picture, "Safety in Air Depot Machine Shops," has received the "Safety Oscar" from the National Council on Films for Safety. At the right, Gen. Carl Spaatz, Commanding General of the Army Air Force, receives the award for the best industrial occupational film for 1945 from Sidney J. Williams of the council. Mr. Williams commented on the excellent flying record of the AAF, with its parallel emphasis on ground safety.

Briefing his crew for a 10,000 mile non-stop flight, Col. C. S. Irvine is shown in photo, left. The present holder of the world's long distance record, Col. Irvine planned to fly a great circle route from Hawaii to Cairo, passing over the magnetic pole and London. Crew members of the B-29 are Lowell L. Houtchens, Boeing engineer; Maj. N. P. Hays, Capt. A. Yorra, 1st Lt. T. W. Roberts, Col. Cary J. King, Jr., and Maj. J. R. Dale, Jr.

"Punchin' Jody," home from the Pacific, "fires up" at Fairfield-Suisun Air Base, Calif., for her flight to Oklahoma City and a peaceful training assignment. Last of nearly 250 Sunset Project planes to return, the B-29 had made 10 bombing trips over Japan.

FAMOUS "35" TOURS U.S.

RAF Squadron Visits America to Help Celebrate AAF Day

W/CDR. A. J. L. Craig, DSO, DFC Commanding 35 Sqdn., is 23 years old.

Before flight, Group Capt. Collard, W/Cdr. Craig, S/L Beetham, S/L Harris.

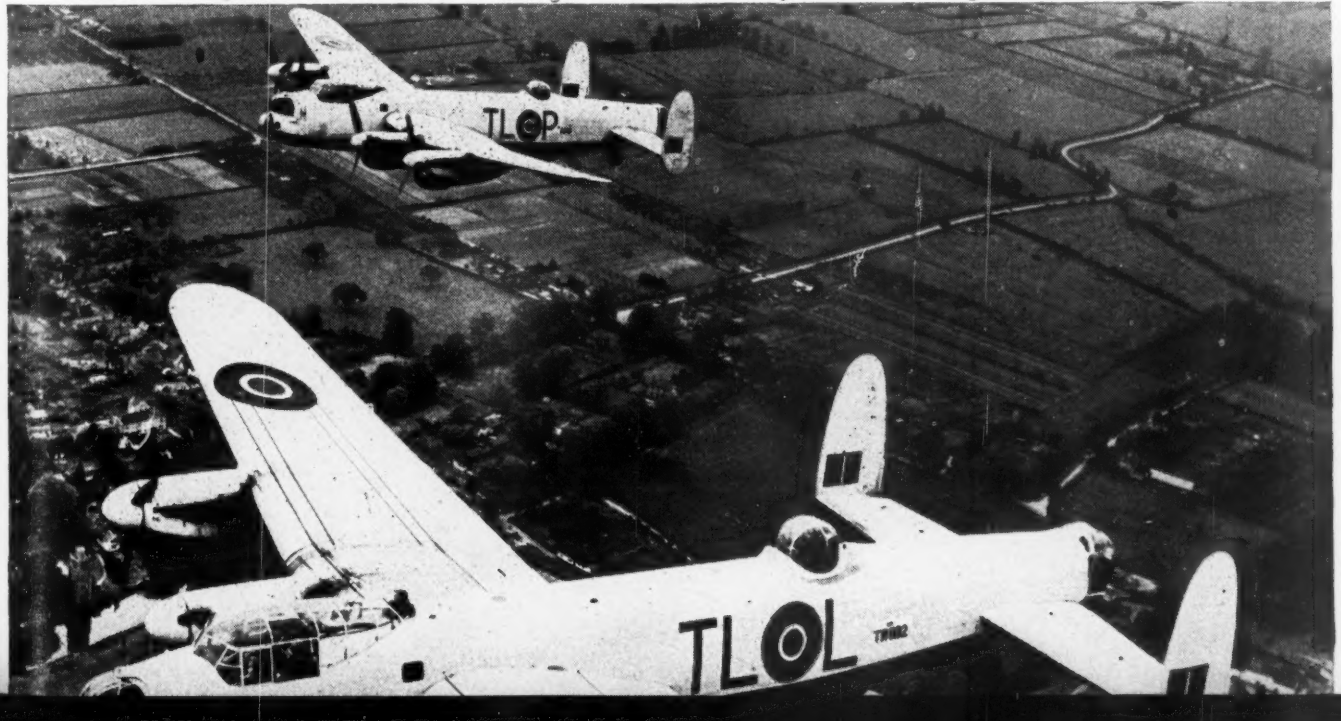
CO of base where Lancs are stationed is 35 year old Group Capt. Collard.

At the invitation of the United States Army Air Force, 16 of Britain's most powerful bombers—No. 35 Squadron, Royal Air Force Bomber Command, flew the Atlantic in July to take part in the celebration of Army Air Force Day August 1.

In action during the greater part of the war, Squadron 35 won its laurels on night missions over industrial targets in Germany. The squadron's Lancasters are the type that carried Britain's 11-ton Volcano bomb for saturation attacks on German armament plants, refineries and industrial centers.

Under the command of Wing Commander A. J. L. Craig, the unit was scheduled to make touchdowns in New York, Missouri, Colorado, California, Texas, Washington, D. C., and Massachusetts during its five weeks stay. Over 200 RAF personnel made up the crews of the visiting aircraft, while over 100 RAF fliers took part in special events. Group Capt. R. C. M. Collard, station commander at Graveley, Huntington, England, was in charge of the operation. ☆

Lancasters of Squadron No. 35 in the air over England before start of trip. Later these wings were seen over U. S. towns.

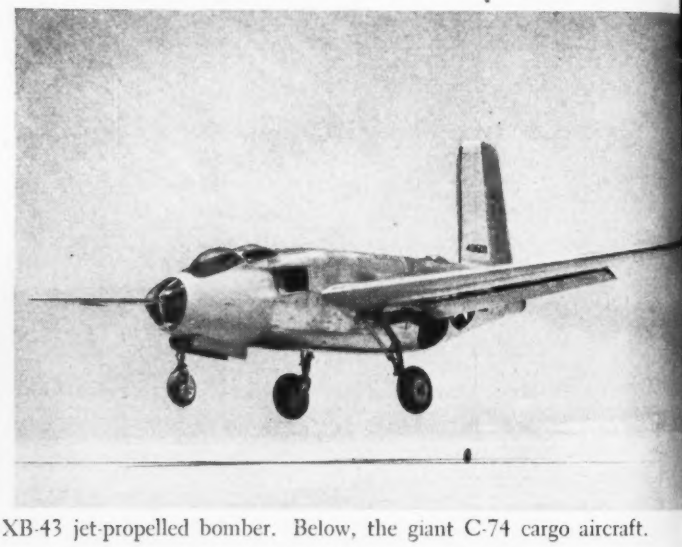


The A-26F is a twin-engine light bombardment, attack plane. A pilot's dream, it is capable of high speeds at low levels.

AAF

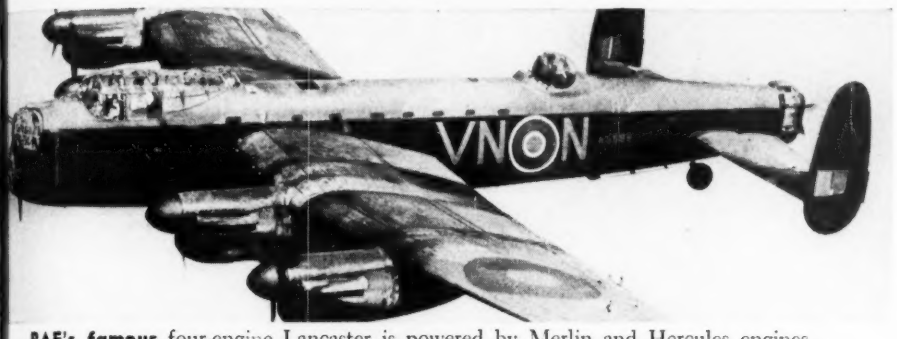
These are photos of the newest AAF aircraft. All have become operational since the war's end.

The world's largest land-based bomber, the XB-36 is powered by six engines.



Above left, the speedy jet fighter, the XP-84. Above right, the XB-43 jet-propelled bomber. Below, the giant C-74 cargo aircraft.

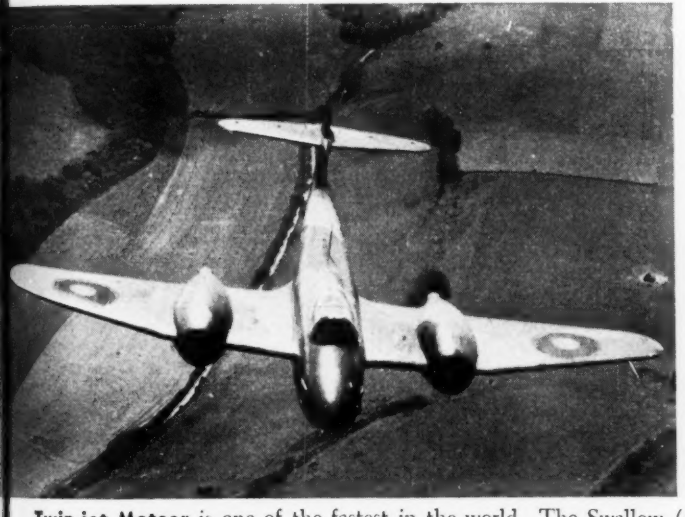
Designed for the RAF as a two-motored long range fighter, the propeller-driven Hornet has a top speed exceeding 470 mph.



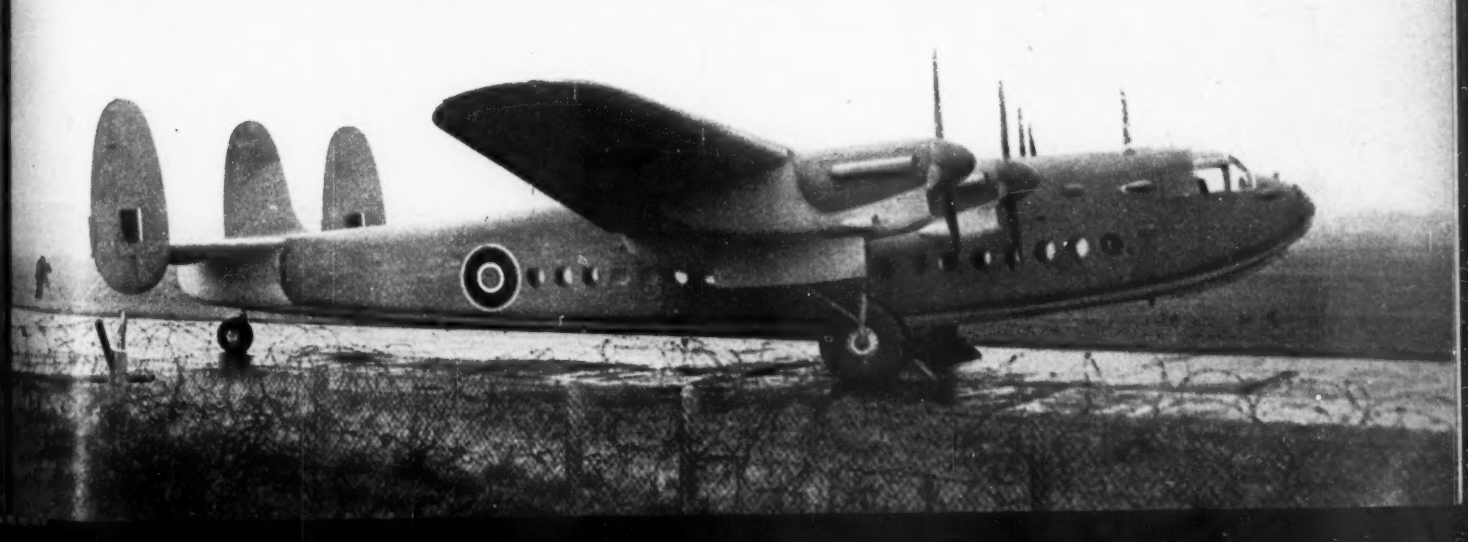
RAF's famous four-engine Lancaster is powered by Merlin and Hercules engines.

RAF

The British too have come up with new types of planes. The RAF continues to be active.



Twin-jet Meteor is one of the fastest in the world. The Swallow (right) is newest jet fighter. Below, Avro York, cargo and transport plane.



AAF INSTITUTE OF TECHNOLOGY

BY LT. CARL R. HART, *AAF Review Staff*

The importance of highly trained flying personnel has long been recognized by the U. S. For example, this is the class of 1923, Air Service Engineering School, and members of that staff. THE REVIEW would like to hear from those who may recognize the men pictured here.

A streamlined version of the justly celebrated axiom which counsels the killing of two birds with one stone is currently presented by the Army Air Force in the form of the officially established AAF Institute of Technology—a full-blown, scientific air school geared to the knotty and bewildering problems of the new Air Age which was ushered in at the end of the war.

This institution has been designed not only to solve the AAF's presently imposing problem of providing for itself an adequate reservoir of highly trained technical personnel, but at the same time by so doing to offer an attractive future to those of its officers whose education at the outbreak of war was interrupted or whose careers had just begun to burgeon.

The stated purpose of the institute is to provide training which will assure scientific research, design and the technical development of AAF equipment, as well as the efficient operation of procurement, supply, maintenance and service responsibilities assigned to the Army Air Force.

The course of instruction, under the direction of Headquarters, Air Materiel Command, at Wright Field in Dayton, Ohio, will include: aeronautical engineering as applied to the AAF; application of scientific development to meet requirements for equipment; maintenance, engineering, procurement, supplies and the service functions assigned to the AAF; staff organization and function within the AAF; factors affecting the formulation of experimental and research programs and the coordination of such programs with overall plans; and the responsibility of commanders and staff officers of the AMC service organizations and units with respect to leadership, administration, intelligence, communications, public relations, personnel management, methods of instruction and civil affairs.

At present, a certificate of graduation from these courses can only be applied toward a degree, but it is hoped that in the near future it will be possible to graduate the students of AIT with a bona fide degree that will be honored by the National Education Association.

Experience encountered in World War I prompted the War Department in the realization that air supremacy would be a deciding factor in any future war and set the stage for the establishment of an Army school of training whereby officers would be instructed in advanced aeronautical engineering. The history of the school began in 1914 when Capt. Virginius E. Clarke of the U. S. Army was detailed to the Massachusetts Institute of Technology for aeronautical engineering study. During World War I, an Army and Navy School of Aeronautical Engineering was established at M. I. T. and a total of two emergency classes were later graduated.

The original school was proposed by Col. Thurman H. Bane and, upon approval by the War Department, was established at the Engineering Division of the Air Service at McCook Field, Dayton, Ohio, under the name of "Air School of Application" in November, 1919. Colonel Bane was designated Commandant of the school, the name of which was changed to "Air Service Engineering School" in 1920. Since 1919 training for officers in aeronautical engineering has continued almost without interruption. Until the outbreak of World War II, the school had been closed only during the years 1927-28 and 1939-40. Shortly after Pearl Harbor, due to the urgent need for all personnel elsewhere, classes had to be suspended and the school remained inactive until April, 1944.

Since its founding in 1919 the school's official designation has undergone five changes. Following the change of the original school name from "Air School of Application" to "Air Service Engineering School" in 1920 came a new designation "Air Corps Engineering School" in 1926. When the school was reactivated in April, 1944, it was redesignated "Army Air Forces Engineering School" and now bears the title "Army Air Forces Institute of Technology."

While curriculum and extent of material covered has varied from time to time, depending upon the needs of the service and the background of the student officers, the school has always been unique in that it offered instruction which was not obtainable elsewhere, particularly information

(Continued on Page 37)

Command Performances

COMMAND PERFORMANCE

Maj. Gen. E. R. (Pete) Quesada

TACTICAL AIR COMMAND

From lessons learned in combat TAC is developing and expanding to meet the airpower requirements necessary for an air-minded post war world.

By Lt. Hal Basham, *AAF Review Staff*

Out of the tangled shambles of post V-J Day disintegration, the AAF today is emerging with an elite, stream lined version of the great aerial striking force which rang down the final curtain on world anarchy in the smoke of Hiroshima a year ago this month. Pointing a finger of destiny toward the future role of this new AAF is the Tactical Air Command under Command of Maj. Gen. E. R. (Pete) Quesada.

When American forces landed in the initial invasion of North Africa, tactical air power as applied to coordination with ground forces was little more than a dream in the minds of certain far-sighted leaders—Pete Quesada, commander of the XII Fighter Command, for one. When von Runstedt's final desperate counter-attack was crushed in France by fighters and fighter-bombers of Pete Quesada's Ninth Tactical Command, tactical air power had come into its own. Today the lessons and tactics learned in those years in Europe and Africa and applied in triumphant form in the Pacific are being developed and expanded by TAC to meet the airpower requirements of the atomic age.

The mission of TAC in the new Air Force is based on three principal objectives: to cooperate with ground and naval forces, to train and equip mobile flying combat striking forces for independent operations anywhere in the world, and for the time being, to support army recruiting with a nation-wide air demonstration program. To accomplish this triple mission, plus such other tasks AAF Headquarters assigns it, TAC was given command of three air forces in a recent re-organization. They are the 3rd Air Force, principally a troop-carrying unit, the 9th Air Force with fighter, attack bomber and photo reconnaissance groups, and the newly re-activated 12th Air Force already equipped with many jet planes. Each of these three air forces is doing its specialized job at its various bases under the supervision of TAC headquarters at Langley Field, Va.

In line with the first of these objectives, that of close cooperation with army ground forces, TAC held a unique ground-air conference in June attended by generals and staff officers of the ground forces and of TAC. Maj. Gen. C. R. Huebner and Maj. Gen. W. G. Wyman, Army Ground Forces G-3 and G-2 commanders respectively, were the principal ground force representatives meeting at Langley with General Quesada and his staff.

At this conference a combined operations program, whereby all branches of the ground and airborne services can be given a comprehensive demonstration of air-ground cooperation twice each year, was presented by TAC. The plan was presented to the ground forces as a tentative, flexible model which could be adapted and modified to meet the needs of each of the individual branches of the ground forces. It was designed to utilize and present to the best possible advantage the fundamentals of highly specialized air-ground teamwork which out-thought and out-fought the vaunted German Wehrmacht and Luftwaffe at every turn. Briefly the plan was this:

Twice each year at an AAF installation suitably located and equipped specially for the program, TAC proposes to conduct in conjunction with each of the ground forces a short course in applied air-ground tactics TAC transports will fly each ground force contingent to the school and return it after completion of the course. Each course will be adapted to the particular needs of the individual ground unit since the various branches need different types of aerial cooperation. This intensive training course would give each ground force unit a complete picture of air cooperation and aerial striking power from the time the ground unit in the field calls for air power to the time the planes return to base after accomplishing the mission. Each year the latest developments in equipment and tactics will be employed, keeping both air and ground forces up to date on combined operational technique.

By conducting such a school TAC could give a complete adequate picture of air-ground teamwork, something General Quesada describes as "utterly impossible" under the present system of sending out a few planes to widely scattered ground force bases all over the country to participate in spot maneuvers. With this plan as it is finally adopted TAC expects to accomplish the first of its three objectives—that of close coordination with ground forces. However, successful accomplishment of its ground–air coordination is largely dependent upon the success TAC achieves with its own training mission.

In order to accomplish its variegated training mission to provide aerial striking forces for independent operation anywhere in the world, TAC has divided the training program among the three air forces under its command, the 3rd, 9th, and 12th Air Forces.

The 3rd Air Force, with headquarters at Greenville AAB, S. C., is conducting troop carrier training at its various bases under the direction of Maj. Gen. Paul L. Williams, 3rd Air Force Commanding General. At Lawson Field,

Ga., paratroop training is conducted in cooperation with the paratroop school at Fort Benning. The famous 82nd Airborne Division is being flown out of Pope Field, N. C., by 3rd Air Force C-46s, C-47s, and new C-82s. Chinese troop carrier crews are being trained in C-46s at Bergstrom Field near Austin, Texas. The 3rd also has 10 other fields on standby status at present.

The other two air forces, the 9th and 12th, are specified as tactical air forces. The 9th, under command of Brig. Gen. Homer L. Sanders, has headquarters at present at Biggs Field, El Paso, Texas, but is scheduled to be moved to the Atlantic seaboard as soon as possible. The celebrated 47th Light Bombardment Group, equipped with blackout A-26s, now based at Lake Charles, La., is one fully trained and manned group of the 9th. At Brooks Field, Texas, the 69th Photo Reconnaissance Group with photo P-51s and A-26s is stationed. The 69th will be assigned some jet units under future TAC plans. Stationed at Biggs Field with the 362nd Fighter Group of P-51s is the 27th Two Target squadron which works in cooperation with the anti-aircraft school. When the 9th is moved to the Atlantic seaboard the 477th Composite Group at Columbus, Ohio, will be assigned to it and relieved from direct assignment to TAC.

Most spectacular of TAC organizations is the 12th Air Force's Jet Plane group, changed July 10 from the 412th to the First Fighter Group. The First is stationed at March Field, Calif., which is headquarters for the 12th Air Force. Some members of the original First Fighter Group from which the 412 was formed are now flying again under the name of the First. Nationwide publicity has been given to the record-breaking flights of the First Fighter Group and its new P-80s. A new addition to the P-80 line is expected soon in the form of the FP-80, a photo-equipped Shooting Star designed for high altitude aerial reconnaissance. The 39th Photo Reconnaissance Squadron, also assigned to March Field, will fly the new photo ships which will be adopted the latter part of this year. Commanding General of the 12th Air Force is Brig. Gen. J. P. Doyle.

In addition to the units and bases just mentioned, some of which are training crews for occupation air arm duties overseas, TAC has several fields assigned directly to headquarters which are helping to carry out the training mission. Mytle Beach AAF in South Carolina is conducting gunnery, rocket-firing and bombing courses for tactical units which fly in from all over the country for intensive training periods. Tuskegee AAF in Alabama is training Negro pilots. Shaw Field, at Sumter, S. C., is a night fighter station and has P-61s and B-25s. The 167th Liason Squadron is stationed at Marshall Field, Ft. Riley, Kan., and Dover AAB, Del., is conducting continuation training in P-47s. Several other fields in TAC are at present on standby status, waiting to be re-activated to full efficiency upon command.

In maintaining and servicing the planes employed for the various types of flying training throughout the command TAC has encountered and is overcoming a serious personnel problem. At some stations the shortage of qualified maintenance personnel became so acute in the rush of separation that pilots were forced to do all their own line maintenance in addition to other duties to keep their planes flying. Through special schools and on-the-job training, however, TAC is today rapidly overcoming the maintenance problem. Reenlisted mechanics are given refresher courses and assigned directly to the line. Recruits are sent to schools and given on-the-job training to give them the technical "know how" of mechanics. With the personnel situation becoming easier every day another type of training is being launched by TAC headquarters which is expected to have a wide felt effect throughout the command in the next year.

During the rush years of the war almost the entire emphasis of training was on the technical side. The actual military efficiency side of army education was constantly slighted to place stronger emphasis on the immediate need for technical training. As a result the AAF developed a mechanical and technical machine more powerful than any other such organization in the world. But the men in the wartime army lost out on something the peacetime army man had held very dear—the spirit of camaraderie, of espirit de corps, of very great pride in the unit to which he belonged and the place he held in it. It is to restore this cherished part of military life neglected during the war that the new education and training program is being launched by TAC.

The plan will consist of Saturday morning programs of education and military inspections and reviews. Each Saturday of the month will be devoted to a different function.

Throughout the entire Saturday morning program the civilian populace will be invited to attend to further the mutual understanding of civilian and military personnel. Special attention will be given to insure proper facilities for civilian attendance at the athletic events. Emphasis is being placed on the fact that *all* personnel from the commanding general down to the newest recruit will participate in this Saturday morning program.

Because this new AAF of which TAC is a large part is a professional Air Force and designed to constantly change with a changing civilian scene, an emphasis on coordination with the civilian world unknown in the pre-war army is an integral part of its make-up. From the commanding general down to the high-school graduate who recently enlisted in the AAF for a bit of training and world travel before going on to college this spirit of coordination between civilian and military activity is evident. The public relations departments of TAC are all cooperating in the program to constantly broaden the mutual interest and understanding between civilian and military interests.

Because of the importance of this new relationship between the AAF and the civilian world, even TAC's training mission is sacrificed for the benefit of this new program. In speaking of the hundreds of air demonstrations which TAC is putting on all over the country in connection with the Civil Air Patrol, General Quesada said, "Our training is frequently paralyzed by the large number of planes we have taken from our various bases and scattered over the country to put on air demonstrations. We have even received a request to put on an air show for a picnic." Though these air demonstrations TAC is achieving publicity for the army recruiting campaign which would be possible by no other means. In connection with the recruiting campaign TAC has placed two large AAF caravans on the road plus ten smaller mobile unit AAF displays. These shows are at present touring the country spreading understanding of the AAF and good will while seeking new enlistments. As a result of the program enlistments have doubled each month since April! Two spectacular events in the planning stage which TAC recruiting office will schedule in the future are sky writing and towing of large luminous banners at night over metropolitan centers.

Future missions of TAC will be met with "the same realistic attitude with which present objectives are being accomplished," says General Quesada. The role of tactical air power in the new AAF is large and it is certain. It will be conducted in the spirit of progress initiated in combat where TAC was born. ☆

COMMAND PERFORMANCE

Lt. Gen. John K. Cannon

AIR TRAINING COMMAND

It is the responsibility of AAFATC to design the training program, direct its operations and fit the trained individual into proper Air Force teams.

By Col. Robert B. Miller, *Air Training Command*

If the United States had a university large enough to operate branches in more than ten states, offering students more than 150 different, highly specialized technical courses, John Q. Civilian would have an educational setup comparable to the AAF Air Training Command. A university with more than 100,000 students would be an amazing establishment, an educational wonder, but the Air Training Command, which frequently has an enrollment in excess of 100,000 men, handles its administration so smoothly that the entire enormous undertaking seems easy.

The overall manpower needs of the Army Air Force—for fighter pilots, mechanics, radio operators, clerks, even cooks and bakers—are constantly under Air Training Command study. The introduction of new equipment into Air Force operations, such as the current transition to P-80 jet-propelled fighter planes, means an immediate revision of Air Training Command courses.

Courses are constantly being improved and new ones are being planned and established. Introduction of the P-80 into the AAF picture, for instance, requires a special course of instruction for men who will fly the plane, a special course for P-80 mechanics and maintenance men. Instrument specialists must be brought up to date on the repair and maintenance of instruments peculiar to the P-80.

The announced determination of General Carl Spaatz to keep the Air Force abreast of modern science and to maintain an adequate and necessary Air Force "in being," has brought the Training Command face to face with the necessity for matching the training status of manpower, step by step, with technological developments. Lt. Gen John K. Cannon, CG, has guaranteed that the Training Command will do just that. He has made this a definite goal of his Command, even while the entire wartime organization must be stripped down, modernized and reconstructed to peacetime needs.

The vast network of Training Command air fields which General Cannon controls is being carefully integrated by his Barksdale Command headquarters. The eventual peacetime set-up will be a fraction of the size of the wartime Training Command, but it will still be the largest outfit of its kind in the world—civilian or military.

The Training Command headquarters at Barksdale Field exercises control of this schooling through two immediately subordinate headquarters, Flying Training Command Headquarters at Randolph Field, Texas and Technical Training Command Headquarters at Scott Field, Ill.

Through the Flying Training Command Headquarters, General Cannon controls all flying training, the training of men who will actually fly in any one of several flying positions. Control is directed through the Randolph Field echelon and on down to the fields where the training is actually conducted.

Technical training, which includes the training of all ground crews and administrative personnel, is controlled by General Cannon through the Scott Field Technical Training Command Headquarters. Immediately under this sub-command headquarters are the air bases and schools where technical training is actually conducted.

It is the responsibility of the Barsdale Field Headquarters to design the training program, monitor its operation and, above all, to fit the trained individuals into Air Force teams. An aerial gunner, for instance, must not only be a skilled handler of machine guns, but must be capable of fitting into the fighting crew of an airplane. Wartime experiences have clearly demonstrated that air crews must work as a team and it is the duty of the Training Command to see that each man knows enough about the job of his flying mates to fit in.

Courses offered by the Training Command, and there are more than 170 different ones, may be brief "bringing up to date" classes that last no more than three days. These are highly exceptional, however, most courses running from four to 40 weeks.

One new course, now being designed, will require a full year of training, but it will graduate one of the most highly skilled type of airmen in the world—the Aircraft Observer, Bombardment. This course, to be given at Mather Field, Calif., creates a "new" flying position. It stems directly from the bombardier and navigator positions utilized on heavy bombers during World War II, and represents an integration of the two flying jobs.

Early in the war, bombers carried one officer to navigate the course to and from the target. Another handled the bombsight and dropped the bombs. By integrating the two training courses maintained for these men, the Training Command soon was able to produce a navigator-bombardier who could navigate the aircraft and aim and drop its bombs as well. The postwar technician will be even more highly skilled. He will be a navigator, a bombardier

and radar observer all rolled into one. The Air Force has already named him, "Aircraft Observer, Bombardment."

Some training bases, and this is particularly true of the Flying Command, offer only one course of instruction. Goodfellow Field, San Angelo, Texas, is an example of this type of installation, offering primary flight training.

These classes are of tremendous value to the trainee. They are highly complete and represent the very latest in technical information. Equipment used for instruction is the most modern. No private or commercial organization can offer courses on a par with AAF training because Air Force equipment is consistently ahead of private or commercial stock.

Chanute Field, for example, offers highly technical courses for aircraft machinists, mechanics for airplane hydraulic systems, aircraft sheet metal workers, parachute riggers and repairmen, airplane electrical mechanics, instrument mechanics, propeller mechanics, engine mechanical specialists. Communications courses include those for air traffic service technicians, teletype operators and mechanics, aircraft radio mechanics and repairmen, radio operators, radar operators and repairmen.

In addition, experts in weather observing, gunnery, bombardment, and other related subjects are trained.

Training Command installations stretch over a wide southern belt of the United States where weather seldom interferes with training. They are located in a wide arc radiating from Barksdale Field, stretching from the resort climate of Boca Raton, Florida, to Stewart Field, near West Point, N. Y.; from Moody Field, Ga., through Mississippi, Louisiana, Texas, Oklahoma, Nevada, Colorado, Arizona and on out to Mather Field at Sacramento, Calif.

Training Command jurisdiction includes such famed pioneering air bases as Scott and Chanute Fields, Ill., Barksdale Field, La., Lowry Field at Denver, Col., and America's "West Point of the Air," Randolph Field, Texas.

They include such new bases as the desert-surrounded training oasis of Las Vegas Army Air Field, Las Vegas, Nev., and big, sprawling bases like Keesler Field in the lush semi-tropical terrain of Biloxi, Miss.

While most of the Training Command installations cling closely to civilian centers they are complete cities within themselves. Some of them, like Enid Army Air Field, Enid, Okla., are small cities, it is true, but others, like Keesler, have thousands of "citizens" and are larger and more populous than their neighboring civilian communities.

Training Command officials have long been cognizant of the importance of good morale to training. A happy man learns quickly and thoroughly. An unhappy man has trouble. Morale is maintained at a high level at all stations by assuring each individual a well-rounded life. There's work and there's rest and relaxation in proper proportion. Physical training periods keep bodies in healthy trim. Movies, service clubs, gymnasiums all are operated as a part of Training Command activities. Sports teams of Training Command bases often play against civilian teams of the neighborhood, sometimes as free exhibition events to entertain the troops, other times in downtown ball parks or gymnasiums to help the civilian community raise funds for its Red Cross or similar charities.

General Cannon and his base commanders are particularly proud of letters received from civic leaders expressing their pleasure over contributions, social and cultural, made by Training Command personnel to their civilian neighbors.

"We've all learned a lot from these Air Force soldiers brought from every section into our city," one such letter read. "We have been broadened by observing the culture and social appreciations of other sections. We've learned that a nearby Training Command airfield can mean a lot in many ways. And, during the war, we were made to feel close to the war front by seeing soldiers in our midst every day—soldiers heading for combat.

The Barksdale Field headquarters is particularly busy today, mapping out peacetime training programs that will assure the United States Air Force continuing to be the finest in the world. The Command was recently assigned new responsibilities of a most important nature when administration of the AAF Overseas Replacement Depots at Kearns, Utah, and Greensboro, N. C., was placed under the direct control of the Training Command.

Both of these huge installations are responsible for the processing of all AAF officers and men as they prepare for overseas movement and they, too, are being integrated into the overall Training Command picture.

"The war is over, but the Training Command has a big job to do," General Cannon says. "Other Air Force Commands have the job of strategic planning and air defense; of developing the finest aircraft in the world.

"The Training Command must train each individual who takes his place in the Air Force of the future. We have the finest planes, we must continue to have the finest men. We will train each man from the time he enters the service and the Training Command gives him his basic training on through the technical or flying courses he may be selected to receive.

"The Training Command is thus a definite factor in the life of every member of the Air Force," General Cannon continued. "The Training Command recognizes that it has much to do with the quality of tomorrow's Air Force. I guarantee that the Air Force soldier, regardless of his rank or his job, will be the best of his kind in the world." ☆

COMMAND PERFORMANCE

Maj. Gen. Donald Wilson,
Commanding General Proving Ground Command

PROVING GROUND COMMAND

In its role as test lab for AAF equipment PGC provides the Air Force with assurance of worthiness in weapons, materiel, and allied equipment.

By Sgt. H. Warren Gieffers, *Eglin Field, Florida*

Organized in May 1941 the Proving Ground Command was based on a war-time need, but its record of achievement and its value have dictated its continuance throughout the military future, at peace or at war.

Under the control of the Command Headquarters, located at Eglin Field, Flordia, Jimmy Doolittle planned his famed Tokyo raid. There, too, the problems surrounding the destruction of underwater obstacles on the Normandy beachhead were solved. In Ladd Field, Alaska, cold-weather tests of men, clothing and machines have proved or disproved the theories of Air Force visionaries. At Muroc Field, California tests approximating tropical and desert conditions have been conducted to find the answer to problems of equatorial operations. The B-29 was tested at Eglin Field, before it set out on its Pacific mission.

At the Proving Ground have been tested all types of aircraft, particularly fighters and fighter-bombers used in the invasion and subsequent operations in Europe as well as in the Pacific. Recently, the P-80 has been the subject of many service tests, designed to determine its range, its lethal capacity, and its acceptability as a first-class, high-speed addition to the list of Army planes.

Ordnance equipment too has been under examination, and guns of all descriptions have received their final check from the expert staff of the Proving Ground. Napalm, the flame-bomb, was developed at Eglin Field, and it was there that it first exhibited its power and presaged its successful use in combat. Radio and radar equipment, photographic equipment, navigation devices, personnel equipment, air-sea rescue equipment and technique, vehicles, tools of every description and every conceivable appliance or device which would aid in winning the war have all been to the Proving Ground for consideration.

In its role as a test lab for equipment used by the Air Force, the Proving Ground frequently embarks on an inventive journey as well as a testing hop. It is sometimes difficult to tell where the testing stops and the development begins. Thus it is with the Guided Missiles Group, a project which is now being activated at Eglin Field. In the course of testing what is already known about radio-controlled bombs and ships, many new ideas will spring from the minds of the experienced engineering personnel that run the test. At Bikini, Proving Ground men associated with the Guided Missiles Group were actively engaged in making the "Drone" ships a vital part of the Crossroads project. Operated entirely by radio, with no personnel aboard, these B-17 drones, ran photographic missions through the atomic clouds and at the same time picked up samples of the atmosphere for later analysis and check. When the Crossroads project was completed the men returned to the Proving Ground to compile their figures and establish the conclusions that may affect the future of the atom bomb.

At present the project which has interested the aeronautical world and is rapidly nearing completion at Eglin Field is the Climatic Hangar. This huge edifice is designed to accept in its spacious interior the largest airplanes in development today. In operation it will provide all types of weather—ranging from sub-zero snows to tropical sandstorms. In its testing facilities are included every device now known to the Proving Ground, with room for those yet to be developed. It is possible to reproduce every climatic condition equipment may encounter in actual operation, without moving the equipment. This project is one which has a high place in the work of the Proving Ground Command.

The Proving Ground Command, will continue to provide the Army Air Force and the US with the assurance of worthiness in weapons, material and equipment necessary for the maintenance of power and peace in the air age. ☆

COMMAND PERFORMANCE

Lt. Gen. Nathan F. Twining

AIR MATERIEL COMMAND

With continued research and development AMC plays an important role in assuring quality, efficiency and strength of America's air weapons and planes.

By Lt. Gen. Nathan F. Twining

It may be a complete surprise and somewhat of a shock to many Americans to learn that World War II ended without any basically new airplane conceived after Pearl Harbor being used in combat!

The same is generally true of many basic ideas, and already some of these later ideas are in the discard—outmoded by amazing new discoveries. Prior to the outbreak of war we had broadened our knowledge. In the field of electronics we led the world. We were the first of the

great powers to harness and use the fantastic power of the split atom.

However, we learned to our vexation—and almost too late—that the scientists of other nations were ahead of us in the development of rockets, guided missiles, jet propulsion, the use of liquid oxygen and other new fuels for propulsion. The technological developments accelerated by the war have now reached the point where a "breathing spell" will never again be granted. Although we fervently hope that there will never be another war, intelligent self-interest requires that provisions be made for a national defense capable of meeting any eventuality.

One of the lessons we learned in World War II was that an air attack cannot be stopped. Sometimes it can be made costly by attack, but determined, well-trained personnel find modern airplanes cannot be turned back. We also know that for every weapon that has been devised, there has been a counter weapon to neutralize it. This will undoubtedly be true in the future. However, one of the inherent characteristics of air warfare is that the advantage lies with the attacker, and although a counter weapon is developed that will operate with an efficiency of 75-80 percent, a thousand enemy aircraft launched at an industrial area could still get 200-250 through.

If these aircraft were carrying atomic bombs of the type we now possess or more powerful models, that force would be capable of devastating our industrial areas. It is therefore possible for us to lose a war in a matter of minutes!

We know now that integration of civilian and military effort in the field of research and development in peacetime is necessary. In any future war the discoveries of science and the application of these discoveries to military practice on short notice may mean the difference between victory and defeat. This country must not be caught short again. This country must be certain that in scientific and technological development the Army Air Force is at least equal, and preferably superior, to any military air force in the world.

It is especially vital that teamwork between science, industry and the Army Air Force be maintained in the aeronautical field because most of the important discoveries, including atomic energy, have their most important application in aviation. Only through close relationship and cooperation between scientists, private industry and the military in the progression of a continuous research and development program—a major key in industrial planning for the future of American Air Power—can the factors of security be maintained. Unless we maintain our aeronautical team we cannot hope to achieve and preserve supremacy in aeronautical science. If we have all three in one united effort, then we shall earn international respect and provide peacetime preparedness insurance against any possible future emergency.

The Army Air Force is a major factor in our national security, and the Air Materiel Command plays one of the most important roles in assuring the quality, efficiency, and strength of the Army Air Force—a role of research scientists, economist, mechanic, schoolteacher, and guiding parent to research and development within its many subcommands throughout the length and breadth of this country.

Although the basic functions of the Air Materiel Command are the same in peace as in war, V-J day brought a marked shift in emphasis. In the field of engineering, more than in any other phase of combat, the second world conflict opened up new vistas which this nation must explore against the possibility of another and more terrible war.

Consequently, Air Materiel Command Engineering now is stressing long-range research into the aerodynamics of supersonic speeds and the required means of aiding the human body to withstand the resultant forces. It is seeking too, the most efficient means of propulsion, for supersonic flight and for pilotless aircraft—heralds of push-button warfare.

In addition, laboratory research is stressing development of electronic systems for all-weather flying, precision navigation, automatic, blind, landing devices and radar, airport, traffic control systems. Laboratories are highlighting rockets, guided missiles, and radio control mechanisms for pilotless aircraft.

This experimental work and research is carefully allotted to the various bases under the Air Materiel Command. Projects assigned to the bases were completed after careful consideration of the respective locations, climate, and contingent problems relative to requirements for the development of each project.

Development of guided missiles and pilotless aircraft is being carried on at Wendover Field in the arid wasteland of Utah. Testing of this type of equipment requires unpopulated areas and Wendover is ideally suited for this purpose. It comprises an area 200 by 60 miles.

Sections of Wendover are allotted to various types of test bombing, such as high angle bombing, glider bombing and jet bombing. Experts deem it very desirable as a post-war permanent base because of its geographic isolation and the extensive area available for long distance bombing.

Jet powered aircraft are being thoroughly tested at Muroc Field in California and at the old Muroc flight test base. The California Institute of Technology is conducting research with liquid propellant rocket motors.

In northern California, at Arcata, work on fog dispersal apparatus continues, and further research in the solution of weather conditions is being carried on at Ladd Field, Fairbanks, Alaska. Extensive plans for testing equipment under polar conditions are ready for this winter. One phase of Operation Musk Ox has been completed, but further testing of AAF equipment will be continued under this project, in cooperation with the Canadian Army. AAF testing and research in Operation Musk Ox is coordinated through the depot at Middletown, Pa.

Functional and tactical testing of automatic aircraft pilots is centered at Eglin Field, in Florida, and at the Clinton County Air Base in Ohio, research with the all-weather flying unit continues.

Research in FM-AM, Radar and Electronics is divided between bases at Boca Raton, Orlando and Aberdeen, in addition to the work that is carried on at Wright Field.

Watson Laboratories at Red Bank, N. J. is doing extensive work on the re-designing and re-engineering of ground-to-plane radio and radar equipment, the purpose of which is to make the equipment transportable by aircraft. In addition it has a long range program for the development of warning devices, long range detection and tracking equipment.

The National Advisory Committee for Aeronautics has set up programs for extensive research and development. The committee consists of ranking Army and Navy specialists working in coordination with research experts in industrial laboratories. Fundamental research in aircraft with speeds approaching and entering the realm of supersonic speeds has been allotted to Ames Aeronautical Laboratories at Moffet Field, California, and Langley Memorial Aeronautical Laboratories at Langley Field, Virginia.

The Aircraft Engine Research Laboratories, Cleveland Airport, Cleveland, Ohio, is doing work on advanced en-

gine designs in the jet motor propulsion department.

In addition to work carried on at the AAF bases, research and development is continuous in private industry and in laboratories of our universities and colleges. The University of Maryland's Department of Psychology is experimenting on warning devices for air crews and Boston University, under government contract, conducts a program in optical research under the director of its optical research laboratories.

Wright Field, headquarters for AMC, is a bulwark in the research and development field. However, with aircraft pushing into speeds approximating that of sound, it is obvious that research equipment is reaching a point where it must be augmented by advanced facilities.

Such advanced facilities would be supplied by establishment of the proposed Air Engineering Development Center. Covering an area approximately 100 square miles, this center would provide the AAF, as well as the aviation industry as a whole, with the means to carry on experimentation in advanced aeronautics. It would provide equipment to carry through design from blueprint to flight testing, with adequate facilities for study of fluid dynamics, thermodynamics, electronics and wave phenomena and fuels and propellants.

And there it is, a brief scientific glimpse into the future—a forerunner to the conviction that we are entering a new phase of air power—a phase of higher speeds, increased power, greater ranges. In two wars, the aggressor has moved first against other peace-loving nations, hoping that the United States would remain aloof, or that other nations could be defeated before this country's power could be brought to bear against him. The lesson is too plain for the next aggressor to miss: *The United States will be his first target.* There will be no opportunity for gradual mobilization—no chance to rely on the efforts of others. American airpower is far more than an instrumentality of war. It is the guardian of peace. ☆

COMMAND PERFORMANCE

Lt. Gen. Harold L. George

AIR TRANSPORT COMMAND

Equipped to handle all phases of military air transport, ATC delivered needed war materials and personnel to fighting fronts all over the world.

By 1st Lt. Bill Stephens, *PRO, ATC*

On the morning of May 29, 1941 two officers took over the new "Ferrying Command Office" in Air Force Headquarters, and became the pick-and-shovel-men of what was to become a prodigy unparalleled in the history of air transport aviation. With a total strength of three at the beginning (the third was a civilian secretary), and with no aircraft, no airfields, and no facilities, the organization still managed to mushroom into a full strength command within three years. At the peak of its operations in July 1945, ATC delivered needed war materials and personnel to all fighting fronts over a network of more than 170,000 miles of foreign and domestic air routes. Along that length of air routes, 336 ATC bases served as depots, terminals, and transfer points.

During the robomb blitzing of Great Britain, the ATC delivered to England—within 15 days—126 tons of secret equipment to combat the widespread devastation caused by Nazi V-2s and robot bombs. At this time, the blitz was threatening major damage to Allied invasion forces which were assembled and poised for the jump across the channel into Normandy.

During the first six months of 1945, the ATC delivered to the European theater more than a half-million pounds of whole blood for hospitals and casualty stations in the battle zones. At approximately the same time, 400,000 sick and wounded were evacuated from the war zones to the advantages of modern American medical facilities near their homes.

A-bombs, the ones that wiped out Hiroshima and Nagasaki and brought an early close to the war in the Orient, were delivered to advanced B-29 bases in the Pacific by ATC.

Another part ATC played in the making of modern world history was the transport of VIPs. President Roosevelt was carried swiftly and safely to Teheran, Yalta, and Cairo. Dignitaries to Potsdam were flown by ATC. Key figures from all nations were ATC passengers enroute to many meetings at which world policy was formed.

These highlights are merely the outgrowth of a necessity for a swift and adequate airborne military transport system capable of overcoming any emergency which might arise.

Back in 1941 as the Ferrying Command, ATC's primary mission was to deliver aircraft made in American factories to eastern seaboard transfer points, from which they were channeled to Royal Air Force combat installations. A secondary mission was to provide essential transportation for mail and personnel between the United States and the United Kingdom.

It took only one short year, however, for the demands of war to expand the responsibilities of the Ferrying Command. In 1942, it assumed responsibility for the delivery of aircraft to American and United Nations forces wherever they might be. The range of ATC operation thus expanded from within the confines of the United States to Great

Britain, Australia, the Middle East and the threshold of India. After Pearl Harbor, materiel went by ATC to airports in Burma, Malay, the Netherlands East Indies, and the Philippines. This was only the beginning of the expansion.

To meet the increased needs, reserve officers were called to active duty, civilian pilots were brought into the fold, and airline planes and crews came under the jurisdiction of the Command and carried a large part of the load.

Airline personnel, working under contract with the War Department, continued to carry a great deal of the ATC strength throughout the war. Their previous experience over many of the routes flown, and their intimate knowledge of weather factors proved invaluable in the completion of the Command's mission.

Lieut. Gen. (then Colonel) Harold L. George took over the Command in the first year of its expansion, 1942. He succeeded Brig. Gen. Old, carried the ATC through the war, and is still ATC Commanding General.

By June of 1942, 11,000 officers and men were manning ATC's fast expanding bases, and flying ATC's ever enlarging air routes. During this year, 13,500 aircraft were ferried to destinations within the United States, and 613 were delivered without mishap to foreign destinations. One thousand nine hundred and twenty tons of cargo, passengers, and mail were flown over world routes.

The Ferrying Command had outgrown its original purpose. Realizing this, the AAF reorganized the Command in June and July of 1942. The Ferrying Command became only a part of a newer and larger organization, the Air Transport Command, equipped to handle all phases of military air transport.

One of the biggest problems confronting the Command during this development period was an inadvertent disruption of the organization and personnel of the Command itself on the part of the commanders of theaters through which and to which ATC delivered materials and supplies. Theater commanders often hampered their own supply lines and the supply lines to more remote areas by diverting ATC aircraft and crews from their basic function. To combat this and insure effective delivery of needed materials to all theaters, War Department orders were issued in September 1942 and February 1943 virtually exempting ATC aircraft from theater control. This move enabled the Command to continue the strategic air supply to all regions with greater speed and efficiency.

With the progress of the ground war, more routes were opened to maintain the flow of supplies to the combat troops. Each month brought a rapid increase of cargo tonnage over the "Hump" to China. By July 1945, this weight had risen to the figure of 71,042 tons.

A major operation during most of the war and especially after the invasion of Europe was the air evacuation of the wounded. A system was established utilizing every means available to bring wounded back with the greatest possible speed and comfort. Flight nurses as well as the pilots and crews of these mercy ships were hand-picked.

Another stage of transition and redeployment was presented with the defeat of the Germans. The full force of our armed might had to be swiftly brought against the Japanese. This transfer was in a great share borne by the men and aircraft of the ATC. The Green and White Projects saw 154,497 men and 5,600 twin and four engine aircraft returned to the United States. In this same period more than 73,000 patients were evacuated from overseas to hospitals back home.

Climaxing its four years of World War II was the invasion of the Japanese homeland. A huge fleet of C-54s airlifted 23,456 occupation troops to Atsugi airport along with 1,191 vehicles and large stores of gasoline, rations and other supplies.

Recently seven new services were added to the functions of ATC. These are Weather, Air Communications, Flying Safety, Flight, Air Transport, Aeronautical Charts, and Air Rescue. These additional units will serve not only the Command but all AAF flying activities anytime anywhere and are designed to maintain the highest professional proficiency and safety in the Air Force. ☆

COMMAND PERFORMANCE

General George C. Kenney

STRATEGIC AIR COMMAND

Former Continental Air Forces now designated SAC will accent mobility and immediate long-range striking power anywhere in the world.

By Richard R. Dann, *PRO Staff SAC*

Destruction is just around the corner for any future aggressor against the United States. Quick retaliation will be our answer in the form of an aerial knock-out delivered by the Strategic Air Command under the command of General George C. Kenney. One of the "big three" aerial commands of the AAF, SAC is the long-range striking force of the American air arm which will be held in readiness to strike immediately at the industrial heart of any future enemy over polar routes from the States or from perimeter bases.

With accent on mobility and immediate striking power, the groups of Very Heavy Bombardment, Very Long Range Fighter and Very Long Range Reconnaissance planes of

SAC will be trained and equipped to operate as independent "fighting packages" anywhere in the world or to cooperate with land and naval forces. The new XB-36 is expected to be the principal air weapon of SAC with close support from the B-29s and long range fighters. SAC will be able to carry the fight to an attacker and destroy his aerial onslaught at its point of origin.

Strategic Air Command was activated on March 21, 1946 at Bolling Field, Washington when former Headquarters, Continental Air Forces was retained almost intact and redesignated Headquarters, SAC. General George C. Kenney, who directed the American air warfare against the Japs in the Pacific, was named Commanding General. Major General St. Clair Streett was selected Deputy Commander.

Ten days later at Colorado Spring, Col., the 15th Air Force was activated from the personnel of the former Second Air Force to become the only major subordinate command of the SAC to date. Brig. Gen. Charles F. Born, former Chief of Staff of Continental Air Forces, was named Commanding General of the Fifteenth Air Force. At present all bases of the SAC except Bolling Field and Andrews Field, Md., present and future Headquarters of the command, are under the jurisdiction of the 15th and are lumped largely in the midwestern section of the country.

This month another Air Force will be activated at MacDill Field, Fla., and given the famous title Eighth Air Force, which name was returned from the original organization now stationed at Okinawa. Eventually, SAC may absorb a third air force bringing the command to its projected peacetime total of three.

The interim mission of the Strategic Air Command is threefold:

1. To be prepared to conduct long-range operations in any part of the world at any time either independently or in cooperation with land and naval forces.

2. To conduct maximum long-range reconnaissance over land or sea either independently or in cooperation with land or naval forces.

3. To provide combat units capable of intense and sustained combat operations in any part of the globe, employing the latest and most advanced weapons.

In addition, all special projects that fall within the scope of SAC, such as the recent dropping of the atomic bomb at Bikini, will be undertaken. Task Group 1.5, the AAF unit with Army-Navy Task Force 1, which actually dropped the atom bomb July 1, was staffed by SAC personnel and operated under the command during the organization and training period at Roswell, New Mexico.

Reconnaissance missions of the command will be conducted by the 311th Reconnaissance Wing, now located at MacDill Field, Fla. During the war the 311th was assigned and accomplished the job of mapping the world. Its photo planes took aerial photographs of uncharted areas while ground parties of geodetic experts determined positions and distances of landmarks on the photos. To the 311th goes the credit for aeronautical charts by which the AAF flew war routes over Alaska, Canada, Mexico, South and Central America, Africa, Europe, India, Burma, China, Japan, and the Pacific Islands.

In order to accomplish its long-range mission and short notice commitments in the future it will be necessary for Strategic Air Command to develop bomber and fighter units organized for complete and immediate tactical mobility. It is planned to achieve this mobility through an operational training program of rotation overseas in which each group will conduct maneuvers as a complete tactical unit from one of SAC's perimeter bases overseas for several months each year. In this manner, every group will attain a fluidity of movement necessary for combat operations of the long range type. The perimeter bases outside the United States which are included in SAC plans have not been announced, but it is assumed that they will be within operational range of the furthermost points of civilization.

Eventually the Strategic Air Command is to be composed of three air forces which will include 21 Very Heavy Bombardment Groups, 12 Very Long Range Fighter Groups and three Very Long Range Reconnaissance Groups. The present senior Very Heavy Bomber, the B-29 which has provided delivery service for the atomic bomb on three historic occasions will soon be joined on SAC flight lines by Consolidated Vultee's XB-36, world's largest bomber. This six engine pusher type bomber with its extremely long operating range will be the major weapon in the SAC program.

When fully organized, trained and equipped with the most modern weapons of the air, the Strategic Air Command will be a consolidation of aerial task forces capable of sending a powerful striking force against an enemy anytime, anywhere in the world. ☆

AIR DEFENSE COMMAND

On-the-job training will be offered members of the Air National Guard and continued training for Air Reserve to mobilize trained men quickly.

By Lt. Lawrence T. Gordon, *AAF Review Staff*

New in name, purpose, and mission, the Air Defense Command is charged with the responsibility of maintaining American air supremacy through two instruments. One is the Air National Guard, the other is the Air Reserve. Together, the units form a first line reserve component for the postwar Air Force and will furnish air units for immediate service in case of national emergency.

Lt. Gen. George E. Stratemeyer, CG Air Defense Command, under whose supervision the ANG and the Air Reserve fall, stated recently, "At the present time there exists a large supply of potential Air National Guard officers with World War II experience. Even small communities could man Air National Guard units under existing tables of organization. However, it should be borne in mind that attrition, due to advancement in age, loss of interest, physical disability and change of domicile, will eventually deplete this large reserve of qualified personnel and make it extremely difficult for smaller communities to sustain a unit. It should be established as a general principle that Air National Guard units will be located in the larger centers of population within the several states. This not only assures a continuing source of personnel, but will permit greater selectivity."

On-the-job training will be offered to members of the ANG at their weekly meeting and during their two-week encampments. Pilots will receive instruction in map reading, aerodynamics, tactics and subjects designed to give them a better understanding of their role in the air. Bombardiers, navigators, radio operators, engineers, gunners and others will maintain their skills and proficiency by the use of training aides.

At present, the program calls for one night of weekly

COMMAND PERFORMANCE

Lt. Gen. George E. Stratemeyer

drill or training for a minimum of two hours, occasional week-end field trips to AAF installations and an annual tour of duty for two weeks. For this service, a member of the ANG will receive full pay and allowances for the period served. In addition to this financial benefit, there are liberal promotion policies for officers and enlisted men.

The Reserve program is designed to maintain and increase the skills of flying and ground personnel. Under the Reserve program, 22,500 pilots will receive training along with 27,500 other aircrew and non-rated officers and 120,000 enlisted men. The program calls for eligible pilots to receive approximately 80 hours of flying each year.

Although the promotion policy of the Reserve program has not yet been defined, it will feature plans to maintain and preserve a young and active Air Reserve. When a Reserve base is slated for activation, local publicity will be released to inform Reservists when to register.

The Reserve program is actually based on two Reserve components: Active Air Reserve and Inactive Air Reserve. The Active Air Reserve will include units effectively organized for rapid mobilization, expansion and deployment. In addition it will include trained commissioned and enlisted personnel for necessary replacements and expansion. The term Inactive Air Reserve will apply to that portion of the Air Reserve receiving no training, no promotions and no active duty. It will receive last priority in the event of a national emergency. Officers of the Inactive Air Reserve will be ineligible for promotion.

The ADC will be an efficient force in event of war. General Stratemeyer has said, "We have no idea where an attack will originate and we have no idea where it will be aimed. We do not have a large enough regular Air Force to station interceptor type aircraft in every state. . . . But we will have something else, a very potent ace in the hole—a new and better equipped Air National Guard and Air organized Reserve than ever before." ☆

AAF INSTITUTE

(Continued from Page 26)

on the latest development and trends peculiar to engineering work on airplanes and aeronautical material.

The obvious reasons for an AAF Institute of Technology arose as the result of the scientific advancements made during World War II which led to a natural conclusion that military operations of the future will be won by the nation at whose command are the most highly scientific developments. Courses in procurement, supply and maintenance are therefore recognized as a specialized field comparable to engineering training for specialists in the engineering field. It was also demonstrated in the earlier phases of the war that no one in the supply division was capable of computing supply requirements in the true sense of the word; likewise in maintainence, management and procurement, specialists are needed who not only know the logistics of supply but are also trained in engineering terminology and engineering practices so that the common understanding of the technical phases of one branch or another will be familiar to our future specialists.

Some of the greatest names in aviation, men who directed the destiny of the Army Air Force both in the theater of operations and at home during the recent war, as well as highly regarded and well-known men in commercial aviation, are graduates of the school.

For example, there are General George C. Kenney, graduate of the 1920-21 class, and Lt. Gen. James L. Doolittle, graduate of the 1922-23 class. Little needs to be said about them as their well-known records speak volumes and their contributions to the science of air warfare and aviation in general have been of great value to all concerned. Brig. General L. C. Craigie graduated in the 1934-35 class and after serving well in various commands throughout the world, was assigned Chief of the Engineering Division, AMC, and is responsible for the research, design and development of aircraft and all allied equipment for the AAF. Brig. General Mervin E. Gross, graduate of the 1932-33 class, has been designated Commandant of the new Air Institute of Technology. He is no stranger to Air Materiel Command at Wright Field. His assignment as Chief of Requirements Division, Headquarters, AAF, during the war, kept him in close touch with AMC at all times.

The initial course of the institute begins September 3, this year. Applicants are limited to Regular Army and Category I officers (the latter being required to agree to remain with the AAF at least four years after graduation): officers who have completed at least two and preferably three years of college work leading toward a B.S. degree; and to those who have aptitudes for and desire engineering AAF assignments. For those applicants whose natural aptitudes or desires point more particularly towards logistical assignments, the completion of two but preferably three years of college work may be accepted.

Applications will be submitted through command channels to the Commanding General, AMC, Wright Field, Dayton, Ohio, Att: TSPRTI for subsequent forwarding to the AAF Institute of Technology. An attachment or endorsement thereto shall contain certification by Commanding Officer as being at least excellent in efficiency ratings. Efficiency index must be 40.00 or above. A copy of Form 66-2 must be attached. The application must also be accompanied by a transcript of previous college work as proof of work accomplished and high academic standing. Officers selected will be notified by the Commanding General, AAF. ☆

ABLE DAY AT THE CROSSROADS

(Continued from Page 11)

Dr. Robert Oppenheimer, Bradley Dewey, Dr. Karl Compton, Dr. Albert Einstein and many others—said would happen on Able Day did happen, almost exactly as they had outlined. "We expected nothing spectacular from this," Dr. Compton told us on Kwajalein. "Anyone who has worked closely on this subject will tell you it came off just about the way it was predicted."

The views of joint Army-Navy Task Force One were equally conservative in the Task Force operations plan, written in April, the official estimate of the situation leads off with this statement: "The direct effect of the explosion of the bomb may sink some and heavily damage other ships in the immediate vicinity of the center of the explosion. . . ."

It was interesting to note during the next few days after Able, the change in attitude on Kwajalein. As a result of first hand inspection of the target area, skepticism was replaced by a genuine and terrifying awe of the most terrible weapon the world has ever known.

Very early on the morning following bomb drop, seven correspondents flew from Kwajalein to Bikini in a C-54 photo plane. Safety officers had declared the air over the target area to be free from too much radioactivity but our plane carried Geiger Counters and an air monitor—Col. Russel S. Leone, Task Group surgeon—just to play it safe. Arriving at Bikini, we circled the entire target array at 300 feet for a considerable period. The damage was impressive —and not a little surprising after the somewhat lukewarm accounts of the day before.

Oil slicks appeared over the spots where the destroyers Lamson and Anderson and the transports Carlisle and Gilliam were sunk; the Japanese cruiser Sakawa was then sinking; the aircraft carrier Independence was a complete shambles; the submarine Skate appeared to "have had it." Fires were still burning, the Nevada's stern was seared and it was obvious that at least half a dozen other capital ships had been given some decidedly rough treatment.

On the flight back to Kwajalein most of us were pondering the same thing, in spite of the fact that the Able drop the day before could not possibly be construed as simulated combat tactics since, in the first place, Naval vessels would never be placed in the position of those in Bikini lagoon and secondly, no aggressor, however confident, would make an aerial bombing attack on a sizable fleet with merely one bomber and one atomic bomb as its striking force—nevertheless, the thought kept hitting us in the face, if one atomic bomb dropped from the air could cause all the damage that we had personally seen, imagine the annihilation that would result from ten or even five such bombs against a city, a fortification—or even a fleet.

These preliminary observations were confirmed even more strongly the following day—Able Day Plus Two—when we again flew to Bikini. This time our amphibious plane landed on the lagoon itself and we boarded some of the heavily damaged target ships. The destruction was almost unbelievable. We found decks buckled, stacks twisted like corkscrews, some bent double, heavy steel hatches blown in by the terrific pressure of the heat, plates broken, superstructures demolished. And on every ship the evidence of terrific heat and the peculiar pungent smell of scorched iron.

Radioactivity was still present in dangerous quantities in many parts of the ship and these had already been zoned off by monitors who obviously paused only long enough to scrawl crude signs on walls and hatches—"RADIOAC—KEEP AWAY."

Later we learned that many other ships which appeared to have very little outside damage had in reality suffered considerable internal destruction. The significance of this was not lost: Not only were the ships themselves rendered inoperative, but it is doubtful that any crew member, had they been in these sections of the ship, could have long survived the effects of concentrated radioactivity.

Briefly, the early returns present this box score: Sunk—five; heavily damaged — Independence, Skate, Pensacola, Arkansas, Salt Lake City, Critenden, Drydock Traker and an LST. Damaged moderately to superficially—19 others.

But it is too early at this point to know the bomb's effect on life aboard the target vessels. One goat still alive on Able Day was found to have a white corpuscle blood count of zero and died next day. What has happened to the white rats aboard the ships and in the drones is unknown.

It is also still too early to draw conclusions concerning the success of the bomb, the vulnerability of Naval craft to this type of weapon, the effect of atomic explosion on life, disease, and such technical equipment as radar, radio and television, as well as its effects on aircraft and their instruments.

These things can only be accurately assessed when all the data have been collected and thoroughly studied—a process that may take months.

Likewise it is equally premature at this point to attempt to provide answers to a score of imponderables including the reasons for the obvious, but still inexplicable, inaccuracy in the bomb-drop. In spite of the apparent perfection of the bomb run, Gilda, as the world now knows, fell considerably short of the target ship Nevada. Every effort is being made to check thoroughly into the three possibilities for inaccuracy in any bomb-drop, namely: Crew error, bombsight malfunction and malfunction of the bomb itself. To date, lack of opportunity to examine film now in the states made of the bomb's entire flight has prevented any definite conclusion from being reached.

And although the bomb might have sunk the Nevada had it exploded within the planned 500 feet of that battleship, and although it "might have" done any one of a score of different things, this paramount fact in the entire Able Day operation emerges with increased clarity as each day passes in Bikini lagoon: That the dropping of this atomic bomb has fulfilled for the Navy, Army, AAF, Manhattan District, the physicists, radiologists, aerologists, oceanographers and all other units and individuals participating in Crossroads the precise requirement of the mission.

It was a great show. The Army Air Force—in Task Group 1.5—had the stellar role for Able Day and played it with the skill, ingenuity, and professional polish of the most accomplished veteran. And when the curtain had come down on their performance, the Task Group came in for the well-deserved accolade of its audience. Said Secretary of the Navy James V. Forrestal, "The Army Air Force was magnificent." Said Assistant Secretary of War for Air W. Stuart Symington "I congratulate you on a perfect mission." From General Kepner, "It was one of the most successful, if not the most successful air mission in which I have ever participated." And finally from Bradley Dewey, chairman of the joint chiefs of staff Evaluation Board, "I always knew the Army Air Force was good, but I didn't know you were this good until I saw you in action on Able Day." ☆

ATOMIC 'MINUTE MEN'

(Continued from Page 13)

grave importance however, would be the tremendous amount of radiation emitted in the first split second and the fission products released and borne upward in the seething cloud. Mainly responsible for the radiation effect are the so-called "hard" gamma rays and the neutrons. The gamma wave is an energy wave very similar to those produced by a high power X-ray machine, while the neutrons are those bullet-like projectiles whose bombardment of the atom initially causes fission and whose emission from the splitting atom is responsible for the chain reaction, the basis of harnessed atomic energy. These particles and the degenerating radioactive fission products are capable of causing injury and death to living organisms and all of them are present in and around the atomic cloud, although the greatest amount of radiation effect is caused in the first moment of detonation. The range at which this radiation is harmful, that is, the distance neutrons and gamma waves travel in force—is not completely known and is thus another factor which must be calculated with caution. The fission products, in reality airborne bits of radioactive material, are governed in their course by wind direction. Such products might be inhaled in air encountered in flight and getting into the blood stream via the lungs set up small radioactive foci in the body. As a precaution against this type of thing, oxygen masks were handy, with instructions issued to crews to use 100 per cent oxygen at the first warning from the Air Monitors.

Even without actual contact with the radioactive products, the energy emitted by them may cause damage. The gamma waves, for instance, can penetrate more than six feet of concrete so that no B-29 fuselage offers even the slightest protection against them. The alpha particles, on the other hand, are cut out by even a piece of paper, so depend for their lethal effect on close contact. Destruction of the white blood cell forming tissues of the body, of the generative cells, and severe X-ray like burns are some of the effects to be warned against. Here the question of dosage plays a role. Radiant energy is measured in terms of Roentgen units or "R" and a maximum R per 24 hours was set up as an exposure not to be exceeded. Overdosage might lead (and had led in previous cases) to death from overwhelming secondary infection due to lack of white blood cells. The indoctrination of air crews in these matters was a delicate problem. It was necessary to have them understand the dangers that did exist without frightening them with poorly understood simplifications.

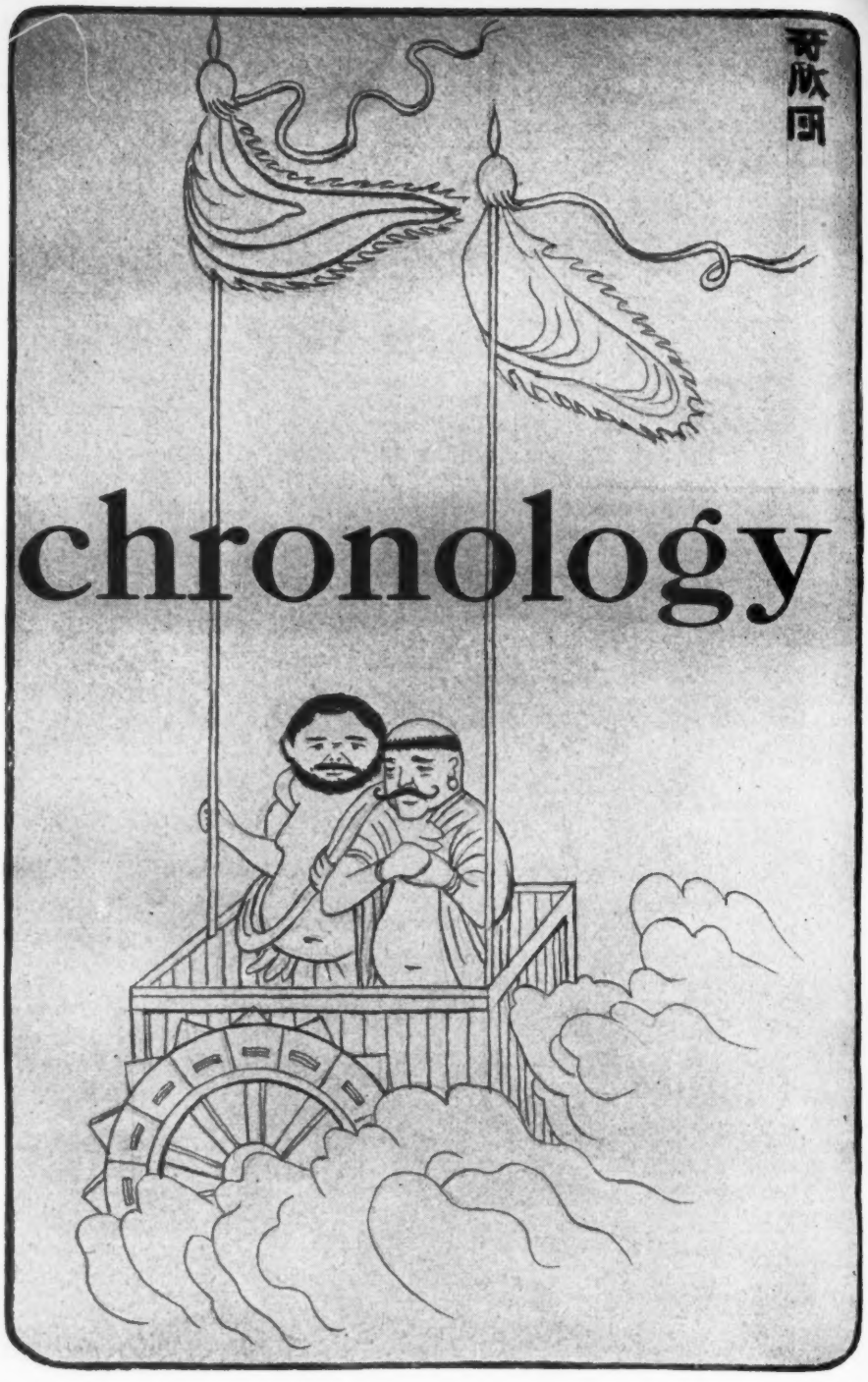
The instruments necessary, then, for detection must indicate two things, quantity and quality. Even though radiation were encountered, there was no specific danger as long as the dosage was not exceeded. And the sensitive counters would indicate the presence of radiation long before the dangerous dosages were reached. So sensitive were they, in fact, that the luminous switches on the oxygen regulators would kick the needle over a point or two. In addition to these counters which indicated both by dials and the warning clicks in the earphones, there were other measures. Each man was issued a "Personnel Casualty Film Badge" at crew check before take-off. These badges were similar to X-ray film and recorded in the same manner the exposure to radiant energy. They were worn on each man's person and at the completion of the mission were returned, appropriately labelled, to the USS Haven for development. Each monitor was also equipped with an electronic "pencil", a device which could be worn in a pocket, and which indicated the total dosage of radioactivity received. This ingenious little gadget was simply a modified electroscope, previously charged, which was discharged by the ionization caused by passage of radiant energy between its two leaves.

The movement of the cloud itself was one of the chief sources of anxiety. The winds over Bikini were very difficult to predict. They varied as much as 120 degrees at different altitudes. This made estimation of the drift of this mass of lethal particles a matter of vital concern. Because in the passage of the cloud there would be a gradual "fall out" of particles, there was danger of contaminating any area over which the cloud passed. One of the things which caused Radiological officers many a sleepless night was the possibility that the cloud might drift westward over Eniwetok, the base of the drone operations. Arrangements were made for the evacuation of the island if necessary, and on Able Day itself, several Green Hornet C-54 transports stood by, ready to take off at a moment's notice should the safety officer have to give the word.

To track this drift after the explosion, the "cloud tracking" missions were set up. These "cloud trackers", officially labelled Radiological Reconnaissance planes, had perhaps the strangest job in the whole Guinea Pig squadron. Two B-29s and two F-13s which would join them at the completion of their photo mission were assigned the job of following the cloud. Their orders were to track and report its progress " until dissipation, or until darkness intervenes". In long elliptical patterns they flew in flights of two on either side of the cloud, reporting on its position, size, and shape at half hourly intervals. Thus the danger areas were plotted as they developed. But until the cloud trackers began their charting, there had to be another method of warning. There was an invisible downwind area which was highly radioactive. This could be roughly predicted and an area delineated in which it was unsafe to fly. This area was a pie-shaped sector, its apex at the aiming point and its curved crust a boundary which changed with the length of time following the explosion, as the radioactive cloud moved downwind. The delineation of this area was known as the "Radex" (condensed from "radiological danger section"). A predicted radex was given at the briefing and changes were announced to aircraft via the U.S.S. Mt. McKinley, Vice Admiral W. H. P. Blandy's flagship.

By nightfall the cloud mass was no longer visible, but guided by the information left by the reconnaissance planes, the precipitron mission on which Lt. Col. Talbot was Air Monitor sought and found the radioactive sectors and flew for hours in borderline areas, delicately balancing the amount of radiant energy necessary for collection against the amount which might cause irreparable damage to living tissues. Their plane, when it landed, was "hot" with radioactive particles caught on oily surfaces and in the carburetor screens. At Eniwetok, the drones were even "hotter". They had flown directly through the cloud and returned with samples of the cloud itself in huge bags. Monitors with Geiger counters and ionization chambers carefully checked them and supervised the removal of the radioactive gases. In all this vast operation no one had been injured by the terrifying forces of nuclear fission. It was a fitting tribute to the work and skill that had gone into the planning by the Radiological Safety Section, which even then was plotting protective measures for the dangers of the underwater explosion on Baker Day. ☆

AAF chronology



By
Sgt. VIVIAN L. SCHECTMAN
AAF REVIEW *Staff*

Centuries before the Indians sold Manhattan for 24 dollars man was dreaming of ways to fly. Marco Polo in his travels wrote of this. Flying may not have been an original thought with the Wrights, but they were the first to invent a machine that worked. This is the first article that has ever appeared on AAF technical developments. It is not a history of the Air Force.

Illustrations by:
Capt. W. M. Mettler, Jr.
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Cpl. Peter Plasencia

Centuries before the Wright Brothers built and successfully flew the first airplane, man had conceived and designed plans for aerial flight. During the 13th century, Friar Roger Bacon in his "Opus Majestus," the world's first encyclopedia looked down the years and saw flight as an accomplished fact. "It is entirely possible," he stated, "that a device for flying shall be made such that a man sitting in the middle of it and turning a crank shall cause artificial wings to beat the air after the manner of a bird's flight."

Many years before this, approximately A. D. 1279, the court astronomer of Kublai Khan constructed a balloon, the Great Armillary Sphere, which is still preserved in the court observatory at Peking. The Chinese also had a system of signals by which different-toned trumpets sounded from the tops of hills and gave notice of impending changes of wind and weather for use by navigators of the Sphere. Marco Polo in his travels saw and wrote about the dirigible.

According to Persian legend, Kai Kaoss, hero king of ancient Iran 1500 years or more before Christ, fought wars which finally made him supreme on earth. He was pursuaded by his counselors to venture upon an aerial journey.

Kai Kaoss had built a light throne of aloes wood. Eagles nests were robbed of male eaglets which were fed until strong and trained to carry this throne into the air. Its corner posts were javelins upon which huge pieces of flesh were impaled.

The young eaglets were harnessed with cord too short for them to reach the meat. It was their efforts to reach the food that carried the throne upward. The king sitting majestically on his throne with sufficient food and a goblet of rare old wine rose on his journey. The eagles, however, soon tired of useless striving, folded their wings and dropped Kai Kaoss into the Kingdom of China, where his royal champions found him. "You are more fit for a madhouse than throne, oh king," cried one of his counselors. Whereupon he acknowledged his folly with tears and returning to his palace shut himself up for forty days.

Leonardo Da Vinci one of the great geniuses of all times was giving the world

designs and plans for "mechanical flight" in his time. His designs for parachute and helicopter are found in his "Codex Atlantic" in 1490.

It was not until the time of Louis XVI that the first balloon of the Western world rose over Annonay, France. The first attempted ascension in America failed in 1789. However, during Washington's time a successful ascent took place which was witnessed by the President, Cabinet and many members of Congress.

The Germans claim to have developed the first rocket-powered craft propelled by the explosive force of gun-powder, almost a century before Lockheed dreamed up the Shooting Star.

At the outbreak of the Civil War, America's first military observer, Professor Lowe telegraphed Lincoln after the firing on Fort Sumter. The services of his exhibition balloon for military observation in surveying the enemy's lines were accepted. During the war he mapped and reported the position of the enemy and delivered information which saved the Federal Army.

After 5000 years of effort and centuries after Da Vinci's first design for a flying machine, it remained for the Wright Brothers to make the first successful flight in the world's history in a power-driven man-carrying airplane at Kill Devil Sand Hill, Kitty Hawk, North Carolina, Dec. 17, 1903.

July 1, 1907—The Aeronautical Division was established in the Office of the Chief Signal Officer of the army. One of the first steps taken by the office was to detail Lt. T. E. Selfridge to the home of Dr. Alexander Graham Bell, in Nova Scotia, to investigate his new aeronautical experiments.

December, 1907—Wilbur Wright visited the office of General James Allen, Chief Signal Officer, and as a result of that interview the Signal Corps issued specifications and called for bids for the first gasless flying machine. The specifications called for an airplane that would carry two occupants, fly for one hour, and make a speed of 40 miles per hour. A number of bids were received, three accepted. The Wrights were the only ones to deliver an airplane.

July 30, 1909—Orville Wright, with Lt. B. D. Foulois of the U. S. Army as passenger, successfully accomplished the required army speed test over a five-mile course from Ft. Myer, Va., to Alexandria, Va., and return. Shortly thereafter, with Lt. Frank P. Lahm as passenger, Wright successfully accomplished the endurance test, establishing a world's record of one hour and 12 minutes for a plane with two occupants. As a result the Wright airplane was officially approved and accepted by the Aeronautics Division, August 2, 1909. This was the first U. S. military airplane.

1911—The first experiments with radio in airplanes were begun by the Air Service. Experiments with aerial photography were started the same year, and a Lewis machine gun was fired from an airplane for the first time.

June 1913 — February 1914 — The amount of flying was unprecedented. During the year 3,340 flights were made with a total of 749 hours and 796 passengers carried.

1915—The Air Service devoted considerable time to tests of lubricating oils, testing and balancing propellers, and special work in connection with automatic stabilizers. Experiments were conducted in signalling from airplanes by 'Very' pistols and smoke bombs.

1917—The United States entered the war with an Air Service strength of 65 officers, 35 of whom were flyers, and 1,087 enlisted men. There were 55 airplanes of obsolete training type without equipment.

1919—Lt. Col. R. L. Hartz and Lt. E. E. Harmon, in a Martin Bomber, started at Bolling Field, Washington, D. C., on July 24 and completed Nov. 9 a circuit flight of the United States, covering 9,823 miles.

1920—Major Rudolph W. Schroeder, flying a LePere airplane, established a world's altitude record of 33,000 feet. Sgt. Ralph Botreil, piloted by Sgt. Strong B. Madan in a LePere airplane, set a world's record parachute jump. As Sergeant Bottreil jumped at an altitude of 20,600 feet, the 'chute caught on the rudder. His arm was jammed through the rudder fabric and the force of the wind caused the chute to tear the rudder of the airplane. Although the chute was ripped and his arm injured, Sergeant Bottreil landed safely. Sergeant Madan managed to land the plane safely without the rudder.

Considerable progress was made by the Army Air Service in the development of airways between Washington, D. C., and Dayton, Ohio. Seventy-two towns on a strip 50 miles wide were marked for air identification and the entire route was covered by aerial photography.

A flight, starting on July 15, from New York to Nome, Alaska, and return, a distance of 9,329 miles, was successfully accomplished on Oct. 20, 1920, by army aviation personnel under the leadership of Capt. St. Clair Streett.

1921—The Army Air Service opened the first airway from Washington to Dayton. A 12-passenger Army Transport was flown by Lt. H. R. Harris. The 385-mile trip was completed in three hours, 21 minutes.

Lt. John A. Macready established a world's altitude record when he reached a height of 39,700 feet in a LaPere airplane, equipped with a super-charged Liberty 12 engine.

1922—A three-man altitude record of 24,200 feet was set in a super-charged Martin bomber piloted by Lt. Leigh Wade. Passengers were Lt A. W. Stevens, photographer, and Mr. Roy Langham, observer. Captain Stevens made a record parachute jump from the altitude of 24,200 feet.

Lt. Clayton Bissell completed the first successful night cross-country flight from Bolling Field, Washington, D. C., to Langley Field, Va., and return. Extensive

Kai Kaoss, hero king of ancient Iran saddled some eagles to a deluxe throne and took off.

night flying and landing tests were carried out by Lt. Bissell and Lt. Donald L. Brunner in which landing lights and night flying equipment were developed, thus leading to the establishment of the first scheduled night airways system in the United States.

Lts. Oakley G. Kelly and John A. Macready established a world's endurance record of 35 hours, 18½ minutes at McCook Field, Dayton, Ohio.

Brig. Gen Billy Mitchell established a world's speed record of 224.38 miles per hour over a measured kilometer course at Selfridge Field, Michigan, flying an Army Curtis Racer.

The world's record for non-stop flight was established by Lt. Oakley G. Kelly and Lt. John A. Macready when they flew from San Diego, California, to Fort Benjamin Harrison, Indiana, a distance of 2,060 miles.

A great deal of work was done during 1922 by the Air Service Engineering Department on propeller research. New experiments with steel, duralumin, and micarta props, and extensive whirling tests, were made.

1923—Lts. Oakley G. Kelly and John A. Macready completed the first non-stop flight across the country from Mitchell Field, N. Y. to San Diego, Calif., covering the distance of approximately 2,520 miles in 26 hours, 50 minutes, 38 seconds.

1924—Army airplanes were used to avert a serious flood by bombing ice jams in the Platte River in Nebraska.

Four Douglas World Cruisers of the Army Air Service departed on a flight around the world. Two of the planes successfully completed the distance of 27,553 miles in 175 days.

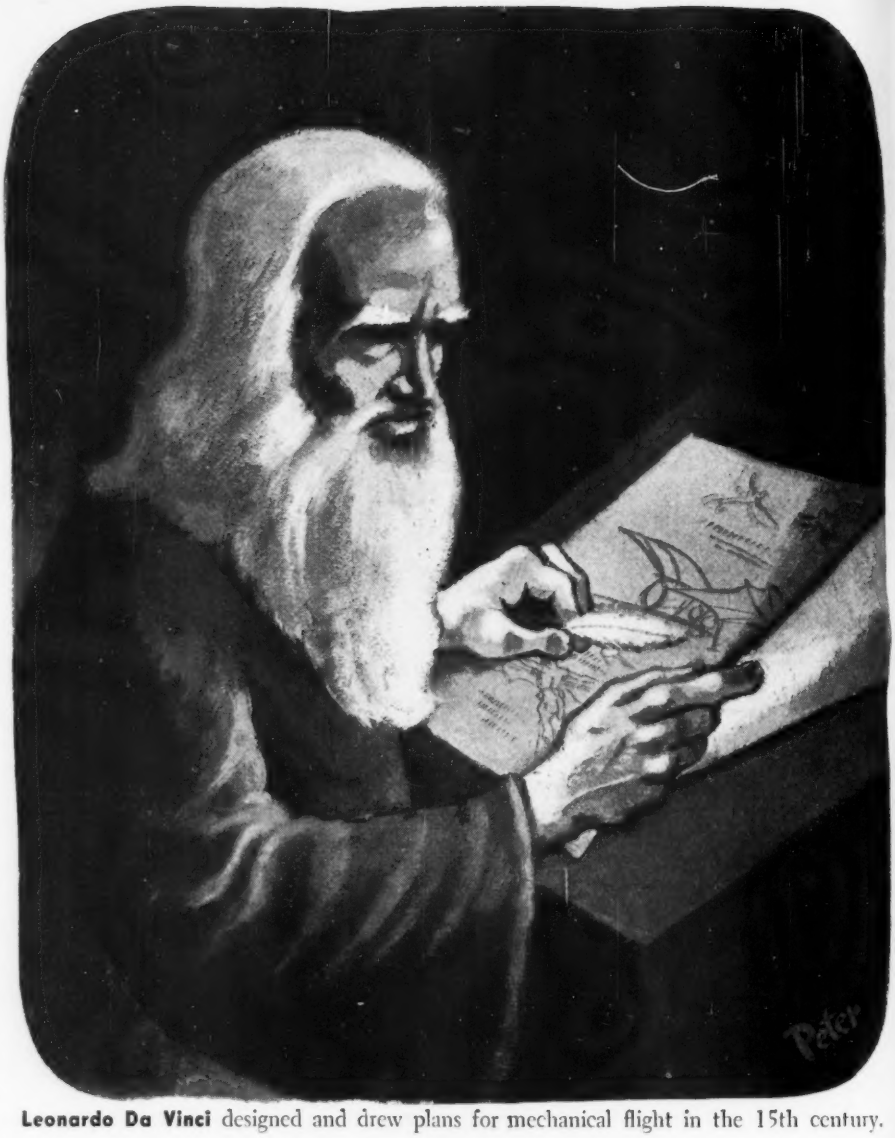
A dawn-to-dusk transcontinental flight was completed by Lt. Russell L. Maughn. The distance of 2,760 miles from Mitchel Field, N. Y., to Crissey Field Calif., was completed in 18 hours and 38 minutes flying time. The flight demonstrated the possibility of mobilizing airplanes at any point in the country within a day in the event of an emergency.

Considerable progress was made this year and climaxed when Lts. John A. Macready and A. W. Stevens photographed the city of Dayton from a height of 32,000 feet. Three achievements of that flight were (1) setting an unofficial two-man altitude record, (2) setting an altitude record for aerial photography, (3) photographing the largest area up to that time by a single lens camera. Nineteen square miles of the city were shown clearly in one picture.

The first radio interview was held between an airplane pilot flying at 6,000 feet, and a reporter on the ground, with equipment developed by the Army Air Service.

Lt. James H. Doolittle, with Mr. Roy Langham, as passenger, completed a 1,550-mile trip in fourteen hours, ten minutes, flying from Dayton to Scott Field, Bellville, Ill., and return. The trip was considered of special importance as showing, from a commercial standpoint, the accessibility of large centers of population when travelling by air.

Later the same year Air Service pilots established the first night airways in the country and flew regular night trips between Dayton and Columbus Ohio.



Leonardo Da Vinci designed and drew plans for mechanical flight in the 15th century.

1925—The general structural arrangement of successful airplanes had been single-bay byplanes with semi-thick wings until now. Experiments by the Air Service turned the trend of development toward smaller lower wings, and experiments in connection with monoplanes increased greatly.

Another marked change also appeared. Until 1925 the fuselages had been mostly of steel tubing with wire bracing. Experiments led to more rigid tubular construction with elimination of the wires. The use of chrome-molybdenum in aircraft construction was started in Air Service engineering labs.

Axles were eliminated from landing gear and installation of turbine superchargers was begun.

Development of air-cooled engines was begun and possibilities of increased weight and decreased weight were recognized by the Air Service.

1926—The first successful radio communication between an army bomber flying at night above Dayton and Station WLW, Cincinnati, Ohio, was established.

1927—Major changes in landing gear were made with the addition of brakes and the oleo shock strut. By that time it had been learned that brakes materially shorten the roll on landing and, when provided with independent operating mechanism, give better control in taxiing on the ground.

The oleo shock strut had been tested on some types of aircraft and was accepted as superior to other conventional types because of its 'no rebound' and better maintenance characteristics.

A movement was started for complete investigation of the possibilities of air-cooled engines on service airplanes. All military aircraft at that time were equipped with water-cooled engines but arrangements were made for installation of radial air-cooled engines on at least one of each type of Air Service airplane for experimental purposes.

Although biplanes were predominant throughout the Air Service, some experiments were carried out during this year with monoplanes. An Atlantic three-engine transport and experimental bomber,—modification of the transport, were developed. The monoplane was desirable in that it provided greater weight-lifting capacity and was more suitable for long flights.

First service tests of the Loening amphibian airplane were carried out and proved that

After the firing on Ft. Sumter, Prof. Lowe offered the services of his balloon to the Union.

the aircraft was suitable for operations over both land and water. Service tests resulted in modifications including reinforcements of the hull, additional protection of duralumin parts subjected to salt water and tropical flights, improvements in directional control for easier operation on long flights. The disc wheel was developed by the air service engineering department replacing wire wheels previously used. Ignition systems underwent an important change with the development of the double magneto, consisting of a single magnetic and double electrical circuits. An important fuel system change was initiated with the development of an emergency hand pump in case of failure of the mechanical fuel pump.

Lt. Lester J. Maitland and Lt. Albert F. Hegenberger successfully completed a flight of 2,400 miles over the Pacific Ocean from Oakland, California to Honolulu, Hawaii.

1928—An Air Service aircraft went into a 'flat spin' and crashed. Investigation of the accident led to extensive flight and wind tunnel research to determine what condition characterized that type of spin. Flight tests were conducted for varying load conditions using dropable weights until the limitations of load distribution had been determined. From that investigation, design criteria were formulated and tests developed for checking spinning characteristics.

In experiments with all-metal aircraft a three-engine cargo monoplane was built by the Ford Motor Company and an all-metal observation plane was built by the Thomas-Morse Aircraft Corporation for service tests. Through experiments with those two aircraft, the Air Service gained technical knowledge which led to extensive use of all-metal aircraft.

The outstanding characteristic of power plant development was expansion of the air-cooled engine with progress centering around the conventional radial type. Experiments on other types of air-cooled engines included the 'vee', 'X', and a new 'hexagon' engine.

Capts. St. Clair Streett and Albert W. Stevens, during a photographic altitude flight, ascended to 27,845 feet, establishing a new record for two man altitude flight.

1929—Flying over Los Angeles, California, from Jan. 1-7, the Army Air Corps transport plane 'Question Mark', under command of Major Carl A. Spaatz, established an endurance record of 150 hours, 50 minutes and 15 seconds. Lt. James H. Doolittle accompained by a check-pilot observer made the first public demonstration of blind flying involving a take-off solely by instrument.

Further research in all-metal aircraft and development of aircraft engines was carried out. Three outstanding achievements were made in the power plant field by Air Corps experimentation: (1) development of ring type cowling for more successful cooling of radial type engines; (2) the first successful application of high temperature liquid cooling of the water-cooled type engine which reduced the size of radiator required 70 percent and resulted in greatly improved engine operating efficiency; (3) research into anti-knock characteristics of aviation fuel.

Lt. H. A. Sutton conducted extensive experimental tests to gain scientific information and established corrective measures for spinning of Air Corps and other aircraft

1930-31—The Air Corps began to break away from old lines of development of aircraft by concentrating more on streamlining and upon monoplane type of construction. Previously, the only Air Corps monoplanes had been of the heavy cargo type. Experiments were begun on monoplanes of smaller design, chiefly of the metal monocoque type.

Aircraft engines underwent many experiments to improve power and performance. The two major problems connected with power planes were their installation with attendant difficulties of drag and weight, and proper cooling. Experiments were begun to obtain more power through improved engines of the same general types and at the same time to cut down on weight and drag. That was done by better engine mounts and changes of design without radically changing the principles of the engine. More highly developed ring cowlings for radial engines contributed to both more efficient cooling and to streamlining

Refinement of design was accomplished by improved construction of parts to secure adequate strength without increase in weight and by reducing drag through the use of improved wing design, retractable landing gear, faired chassis, and better streamlining of cockpit enclosures, windshields, and all external portions of the airplane. The development of all-metal aircraft was continued with a decided tendency toward monoplane monocoque construction because of its more efficient structural and aerodynamic qualities. Extensive tests were begun with high, low and mid-wing monoplanes.

1931—The first cargo plane was successfully converted into an ambulanec plane by the Air Corps. The Air Corps experiments led to adoption of free-swiveling, steerable tail wheels, and parking brakes to facilitate handling of large numbers of aircraft on airdromes. In August, a fluid segregator for use in automatically separating water from gasoline in aircraft engines was developed by Sgt. D. Samiran of the Air Corps and adopted as standard equipment.

1932—An aerial photograph of Mt. Shasta was made from a distance of 331 2 miles and from a height of 23,000 feet by an Air Corps observation plane. At that

time it was the largest amount of the earth's surface photographed at one time in one exposure.

Capt Albert F. Hegenberger made the first blind flight at Dayton, Ohio, seeing nothing but the instruments before him from take off to landing. He did not have a check pilot aboard as was the case when Lt Doolittle accomplished his blind flight in 1929.

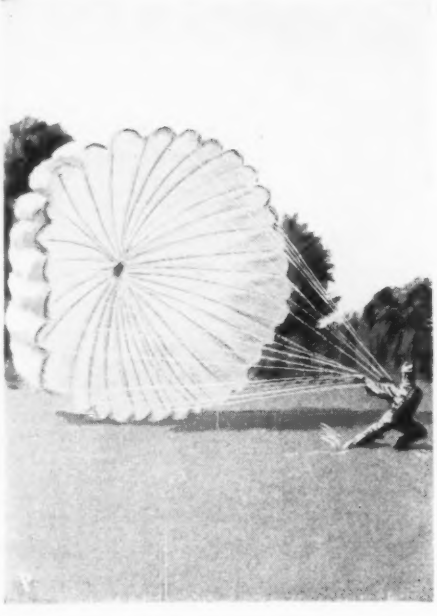
Another major advance in the field of aircraft radio was made by Air Corps technicians in laboratory tests which eliminated over 90 percent of the radio interference emanating from other electrical equipment on the aircraft.

Higher performances of aircraft in 1932 necessitated a searching analysis of new designs submitted and the data thus obtained, together with the results of static tests and wind tunnel research, furnished criteria for new and advanced methods of aircraft design, the methods then being disseminated to the aircraft industry.

Electrical advancement made by the Air Corps was concerned with the development of light generators, a new direct-cranking electric starter, new airplane lights and better means of lighting fields for identification from the air.

The more important instrument developments brought out by the Air Corps in cooperation with commerical manufacturers, included the gyro pilot and gyro horizon indicators and various types of altimeters, compasses, engine gauges, and navigation accessories. A power-operated base was constructed by the Air Corps for swinging airplane compasses.

Air Corps research men continued development of life rafts, life preserver vests, safety belts, two-piece flying suits, corrective goggles, cockpit heaters, and other items of aircraft equipment. Practically every phase of engine development was investigated, including floatless carburetors, altitude mixture controls, mechanical metering of fuel, ram-



ming air intakes, exhaust silencers, oil coolers, sodium cooled valves and pistons, radio shielding for ignition devices, standardization of fuel pumps and mechanical refinement of the turbo supercharger. Investigations were made of ethylene glycol (Prestone) cooling, long tube radiators, oil temperature regulation, and production of lubricating oil by aluminum chloride synthesis.

1933—Outstanding accomplishments of Air Corps engineering included a means for controlling flutter and vibration in airplane structures, the development of more efficient type of ring cowl for radial engines, the simplification of landing gear design to provide quick demountability, and the development of large size streamline landing wheels, together with a corresponding series of tail wheels, having complete interchangeability of parts.

Air Corps technicians prepared 25 preliminary designs of new types of airplanes and made approximately 1,000 drawings for contractors, offering suggestions for experimental installations of engines, cowling, landing gear, skis, cockpit hoods for instrument flying, and other miscellaneous small parts.

Vibration study by Air Corps technicians brought about a definite method for controlling the flutter of control surfaces—this method was passed on to the aircraft industry—and a procedure was evolved for definitely measuring the frequency of any part of a plane structure, which is subject to vibration or flutter. A new cowl fastener (standard on all aircraft in 1946) which sets flush with the surface was developed by the Air Corps in cooperation with the Dzus Manufacturing Company.

Refinement in design of aluminum alloy propeller blades progressed toward the reduction of propeller noise and the control of resonant vibration, which was found to be the cause of several failures. Improvements were made in the manufacture and

inspection of hollow steel propeller blades, and develpoment of controllable pitch propellers continued.

In airplane starter tests by the Air Corps utilizing the new "cold" room at Wright Field, one engine was consistently started at temperautres as low as minus 15 degrees Fahrenheit. Work was begun at developing a new and simpler starter for application to all aircraft.

The Air Corps investigated and prepared specifications for a new alloy of duralumin for use as wing covering which enhanced the mechanical property of the alloy without detriment to its corrosion-resistant properties. A cooperative program was carried out with the Dow Chemical Company to determine the properties of several magnesium alloys which appeared to be promising for aircraft construction.

1934—Outstanding accomplishment was the operation of a school of instruction in

the Air Corps system of instrument landing and the indorsement by the Department of Commerce of the Air Corps system in preference to that developed by the Bureau of Standards. The system was installed at the Newark (N. J.) airport as an aid to commercial air transport. At that time the Air Corps personnel assigned to the project made numerous successful "blind" landings, using the B-10 airplane, and gave instruction to Department of Commerce personnel.

During the Air Corps school, held earlier in the year at Wright Field, 786 "blind" landings were made in less than two months without accident of any kind, either to personnel or to equipment.

A wind tunnel investigation of radio loop antennas by the Air Corps in 1934 and airplane skis resulted in a marked reduction of drag in both cases. Research work led to development of a new type of high tension ignition cable which withstood both higher dry heat and higher hot-oil temperature than the standard type in use at that time. A bi-fuel system, using alcohol-water injection, was investigated as a possible means of increasing power output at low fuel cost and, at the same time, reducing corrosion through a proportionate use of less lead.

Other items of miscellaneous equipment under development during the year included such items as a steam generated cabin heater, observer's case for carrying maps and accessories, emergency cross-country kit, a quick release carbon dioxide valve for use on pneumatic rafts, and fire extinguishers and fluid segregators for removing extraneous matter from aviation gasoline.

1935—A 15-year transition from wood and fabric to metal for the structural parts of military aircraft was climaxed when all military airplanes procured were all-metal construction in which aluminum alloys represented 80 to 85 per cent of the total weight. The use of monocoque fuselage had drastically reduced steel requirements while the air-cooled engine with its aluminum fuel and oil lines had almost eliminated the copper base alloys.

Air Corps research led to the definite abandonment of the use of leading edge slots and auxiliary airfoils in the search for lower speeds and steeper angles in landing. The adoption of trailing edge split-flaps were almost universal by 1935 and Wright Field reports showed much progress in simplifying the trimming controls of airplanes by use of tabs. The conventional stabilizer adjustment was abandoned with a resultant saving in weight and an increase in the rigidity of horizontal tail surface attachments.

In order to keep pace with the increasing demands for engineering research and tests required in connection with the design and development of aircraft and their accessories, the work of the Service and Development Unit of the Aircraft Branch of the Air Corps was reorganized into two laboratories, one for handling special research and tests and the other for handling accessory design and tests. This reorganization permitted a more efficient grouping of engineering specialists and fixed responsibility for the accomplishment of various major projects. A unit was also created for the purpose of studying and reporting on airplanes and airplane designs submitted for engineering criticism, and another laboratory was formed to deal with the increasing complexity of alighting gears on aircraft.

By the end of 1935 Air Corps technicians achieved considerable success in eliminating from aircraft structures the causes of destructive vibration. The control of such had been increasingly important as the speed and size of aircraft increased. Work continued on the development of various types of pumps for operating navigating instruments, de-icers, robot pilots, wing flaps and retracting landing gear mechanisms. Synthetic rubber had been found satisfactory for refueling hose and fuel, oil and water connections but its adoption was retarded by the inability to gain an adequate supply.

For the first time, the autogiro was receiving serious consideration for military use but no machines were available to meet the requirement.

Army Air Corps engineers made the first flight using the radio compass, developed by Air Corps technicians to control the automatic pilot. A Martin bomber, equipped with a Sperry automatic pilot and the radio compass developed by the Air Corps, was flown with additional apparatus combining the two devices.

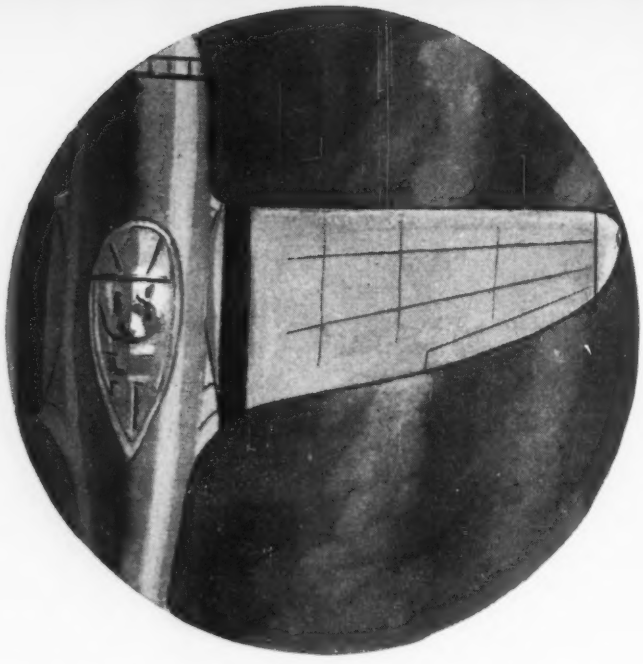
1936—Experimental and engineering work mushroomed for Air Corps personnel as the aircraft program was stepped up to partially compensate for increased activity in other countries. Competitive methods of procurement had required practically the entire engineering and procurement facilities from the time of opening the circulars to the execution of contracts, resulting in a diversion of effort from developmental projects. But methods of handling were improved and personnel increased so that the end of the year found the program only slightly behind schedule.

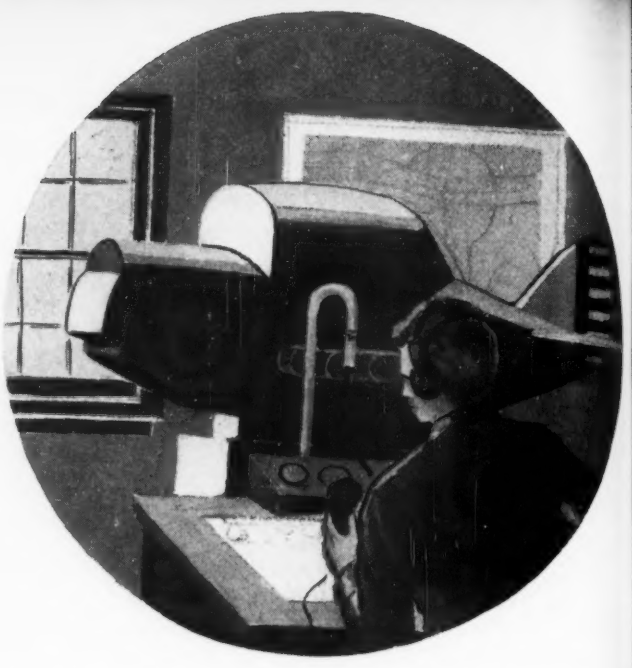
In the line of research, technicians had

developed the wet magnaflux method of inspection for ferrous metals. This test, which disclosed internal flaws not heretofore revealed by any known method of inspection, forced manufacturers to improve their processes of manufacture, especially in the field of propellers where hollow, controllable pitch blades had become almost universal in usage.

Procurement was initiated for several experimental engines to take advantage of the benefits of operation with 100 octane fuel—the fuel which resulted from experimentation and service tests by the Air Corps. The investigation of means of producing 100 octane fuel other than with iso-octane blends was being continued as well as the development of fuels of higher anti-knock rating.

Cold weather starting without the use of external heat at the lowest temperatures became an accomplished fact by the successful development by the Air Corps of an oil dilution system. That system provided for the introduction of a small quan-





tity of gasoline into a portion of the oil in the lubricating system to reduce the viscosity of the oil at starting. Take-offs were possible with a very few minutes by this method.

Automatic flight and landing had progressed to the point where completely automatic, radio-controlled flights totaling several thousand miles had been made with absolute reliability. In addition, semi-automatic landings also had been made. The success of these demonstrations was laid, in a large measure, to the automatic pilot. For air navigation several types of navigating machines for solving celestial and dead reckoning problems were made ready for service application. In addition, Air Corps personnel from the Tactical School constructed sidereal line-of-position curves for simplifying night celestial navigation. The curves were being prepared for publication at the end of the year.

Development was instigated on an automatic engine synchronizer for controlling multi-engine speeds and on a new type of tachometer which, in addition to indicating engine speed, gave the "total" and "trip" readings, the latter recordings constituting a distinct aid to maintenance personnel.

Several special lubricants were developed for use in instruments, gyroscopes and retractable landing gears. These lubricants had a low cold test and a high viscosity index which permitted their use at high and low operating temperatures without appreciable change in physical characteristics.

Power braking installations were introduced on large airplanes, using air or oil pressure as source of power. Air Corps research showed a new type brake drum to be practically wear resistant and, at the same time, to have desirable holding qualities. A new brake-applying device, manually operated, was installed on the brake-testing machine at Wright Field, permitting greater uniformity and accuracy in test work for the Air Corps and on civilian aircraft. In line with the landing problem, new tests were conducted until it was found feasible to lessen the diameter of certain tires, thereby lightening the weight and minimizing wing recesses. This was done without disturbing the carrying capacity or "footprint."

Power plant activities were chiefly concentrated on increasing power output, developing new types of aircraft engines, improving aircraft fuels, extending supercharging to higher power and altitude and developing a system for cold weather starting. In addition, considerable effort was expended in developing aircraft engine accessories, such as vacuum pumps, hydraulic engine controls and fuel pump drives, fuel pressure regulators, fuel injectors, gear boxes for accessory drives, long-reach spark plugs, magnetos, shielding, automatic controls for fuel mixtures and oil temperature and the automatic supercharger regulators.

A new Air Corps experimental laboratory for physiological research was established after completion of 10 research projects dealing with the effects of flying on the human organism.

1937—Considerable progress was made by Air Corps laboratories in the design, development and procurement of special instruments for recording frequency and stress of engine crankshafts, propeller blades, and component parts of the aircraft structure. With vibration equipment for flight measurements available, the solution of individual vibration problems, rather than measurement difficulties, claimed the attention of engineers. The development of both thrust and torque motors, for accurate measurement of power in flight, was also begun. Several studies were made of engines and engine mounts in order to determine the method of making quick engine changes and to provide information for engine designers and manufacturers. Other studies involved arrangements of doors and emergency panels in cockpits with fixed cabins, turn-over protection flying hoods and sealing compounds for built-in flotation compartments.

The Air Corps developed system of magnaflux testing, a non-destructive method for inspecting airplane and engine parts, received great impetus by its application not only in the aircraft industry but also in the automotive, marine and railroad industries. Wright Field personnel developed machines which were suitable for testing parts of all sizes and shapes—from the propeller and crankshaft to the smallest stud.

The search for substitutes for glass windows and windshields, in order to obtain materials with better visibility than non-shatterable glass and improved impact resistance, led to the application of a methyl methacrylate plastic material for the purpose. . . . Application of spot welding for joining aluminum and aluminum alloys progressed further as Air Corps inspectors and research men worked with manufacturers to improve the strength and to construct spot welded wing panels of corrosion-resistant steel.

A series of hydraulic jacks was developed by the Air Corps for the purpose of hoisting airplanes to test the retracting mechanism of the landing gear. . . . A whip test machine was developed and put into operation for testing high pressure flexible hose for use in hydraulic system on aircraft.

Steps were taken to modify the Link instrument flying and landing trainer (ground) to incorporate automatic features to insure closer similarity to actual radio navigation facilities and thereby extend its scope for training purposes. . . . Miscellaneous equipment under development included devices for preventing ice formation on the outside of the windshield and fogging on the inside, together with a means of cleaning water from the windshield; a portable maintenance shelter supported by a canvas-covered, rigid, tubular framework; and lightweight portable collapsible wing jacks for large airplanes.

The first pressurized cabin was developed by the Air Corps. Engineers at Wright

Field, in a high-altitude flight between 19,000 and 21,000 feet, covered the distance between Chicago and Dayton—220 miles—in 38 minutes, an average speed of 350 miles per hour.

1938—A decided emphasis was being placed upon rapid improvement of military aircraft. The United States was definitely behind the schedule of performance and production to be found in foreign countries, and the Air Corps asked all members of the aviation industry to rush plans and models which were being prepared by the industry for military use. The success of the B-17 airplane in service indicated the soundness of the basic principles underlying the procurement procedure. The result was an increasing necessity for Air Corps personnel to utilize its time in preparing specifications, testing forwarded plans and models, and initiating requests to overcome deficiencies discovered in tests. For example, the exhaust and carburetor air intake equipment on the B-17 had given trouble, making it necessary for the Materiel Division to modify and replace with a new design. This state was prevalent on all aircraft being tested.

The first Air Corps service tests were made on the Douglas DC-3 aircraft, later to become the C-47, commonly known as the "workhorse" of Air Corps transport and cargo planes during the war years.

Through experiments many important facts were determined regarding the exact amount of oxygen required at different altitudes, the effect of decreased barometric pressure on the body and the effect of acceleration on the human organism. Results of these tests were incorporated into requirements for development of equipment to be used in both military and civilian flying during coming years.

During wind tunnel tests the first successful method of indicating aircraft speed was developed—through the use of a pitot static tube, also used to obtain true static pressure for determining correct altitude in instrument flying and landing. Much "wind tunnel time" was spent in working on several service airplane models in order to determine and eliminate dangerous spinning characteristics.

Propeller tests were numerous and involved primarily the comparatively new "full feathering" models. An opposite rotation propeller, for the negation of engine-propeller torque effects was completely flight tested on pursuit type aircraft with successful results.

A device for automatically starting the ice elimination apparatus when icing conditions occur and for turning it off when icing ceases was under development in Air Corps laboratories. Outstanding power plant developments were completion of one experimental liquid-cooled engine and the preliminary endurance testing of one air-cooled engine, both with greater numbers of cylinders and greater power outputs than had been obtained before. The first cabin supercharger system utilizing exhaust drive was successfully flown after research and development toward superchargers of greater efficiency and durability.

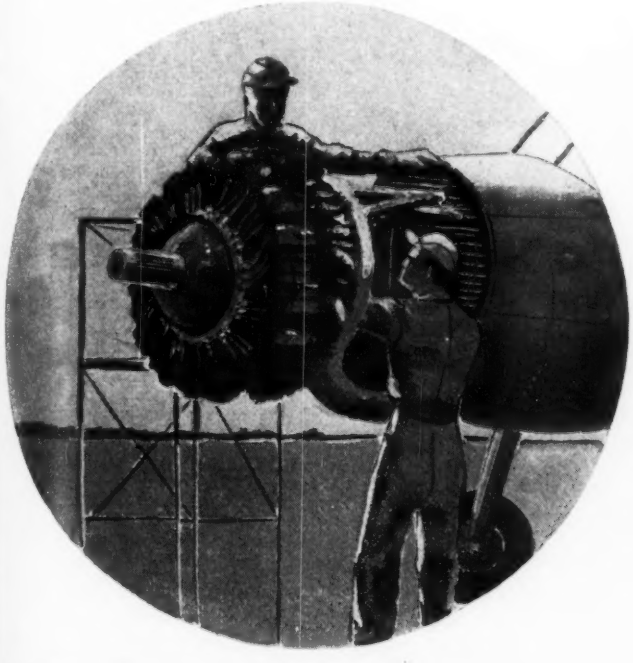
The single sheer web type wing, suggested in 1929 by Paul H. Kemmer, then a student in the Air Corps Engineering School and later a colonel, deputy chief of engineering at Wright Field, was incorporated to great advantage during 1938 into several military and commercial designs. An entire series of Lockheed light and medium transports utilized the wing or portions thereof as have many North American models.

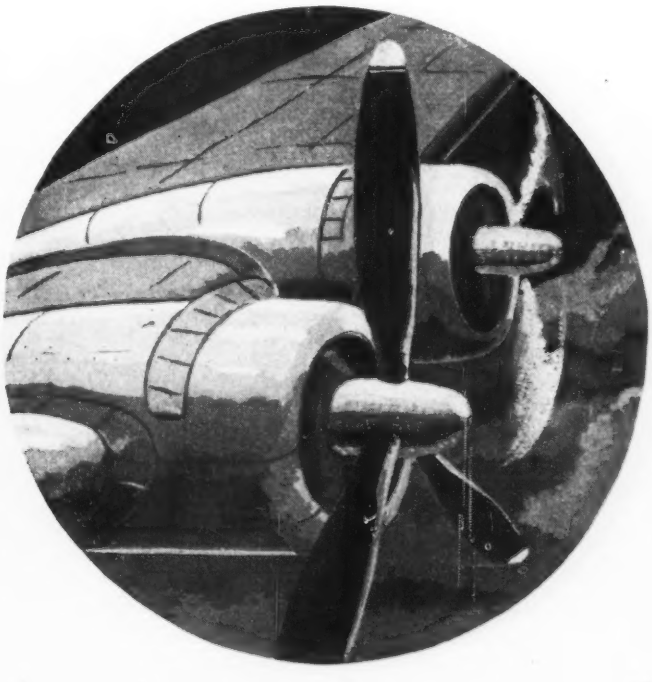
One of the Air Corps' ablest engineers, C. J. Cleary, assistant chief of the materials laboratory at Wright Field, saw one of his products receive recognition in 1938. That product was Nylon, which he had developed in cooperation with E. I. DuPont de Nemours & Co., about 1937 and prior to an actual shortage of silk. It was in the 1939 report of the Chief, Materiel Division, Air Corps, that the following statements were recorded: "A synthetic silk-like material has passed several laboratory tests which indicate that it compares favorably with the best known grades of silk. Material has been procured for the construction of two or three experimental parachutes in which the fiber will be used in the construction of parachute fabric, lines and cordage, web, tapes and sewing threads. The strength-weight ratio of the material is approximately 25 per cent greater than that of natural silk. The material is very resistant to mildew, weak acids and alkalies, and immersion in salt water."

1939—Jet propulsion first came into official recognition when the Air Corps, recognizing its possibilities, asked the National Academy of Sciences to study the problem of compression-ignition engines and rocket or jet propulsion, as a sole prime-mover and to augment the main power plant to improve aircraft performance.

Development of four-blade propellers of larger sizes was initiated through the Air Corps to take care of the demands imposed by the higher-powered engines operating on faster airplanes at higher altitudes. . . . Studies in the wind tunnel, supplemented with flight tests, were also made on basic combat and training types of airplanes in order to eliminate undesirable stalling characteristics. The best solution was found to be the use of two wing sections with a highly cambered section at the tip.

Measurements of flying qualities, particularly on large airplanes, were made to establish criteria and design requirements for airplane control. . . . An elliptical wing tip was designed and tested in an effort to improve flying characteristics on certain type aircraft. . . . A closed air system was developed for operation of gyroscopic instruments in airplanes to provide clean dry air at all times and to give uniform instrument operation at any altitude and under all operating conditions. ☆





WINGS *(Continued from Page 16)*

carry the same equipment as the P-61s in addition to special instruments for the investigation of radio controlled aircraft.

When the controller of the MEW radar set has detected a storm approaching the test area the aircraft will be altered. The P-61s will enter the storm at 5,000-foot intervals—the highest at 25,000 feet and the lowest at 5,000 feet. While in flight they will be tracked by radar and photographs of the radar scopes recorded on film. One plane will be devoted to photographing the thundercloud and making a complete reconnaissance flight around it at fixed intervals. By tracing with radar the path of this plane on each reconnaissance circle, the exact location and dimension of the visible cloud can be obtained. At the same time the radar will show the cloud's rain core. The aircraft making traverses through the thunderstorm will be guided by radar and VHF radio. By this method it will be possible to plot the position of each aircraft at all times so that its location in the cloud can be correlated with the data recorded in the plane.

Much the same procedure will be used when gliders and Navy drones enter the storm. The Navy planes will be alerted at their base, the Banana River Naval Air Station, and will be tracked by the MEW set at Orlando.

Information collected from ground stations and aircraft will be correlated to give a complete picture of the thunderstorm. Every five minutes during the actual tests, surface data will be plotted in synoptic form on maps scaled to three-fourths of an inch to the mile. Wind, temperature, wet bulb temperature, pressure tendency and five minute precipitation amount will be plotted in the usual station mode. Isallobars, isotherms and isohyets will be drawn on each map. The aircraft and balloon positions will be plotted on maps of the same scale for lesser time intervals and for a number of different levels. The pertinent data recorded on their instruments will be entered. The maps and charts will then be reduced to vertical cross sections. Thus, a fairly complete three-dimensional picture of a thunderstorm with its turbulence ratio, precipitation, cloud formation, wind structure and temperature will be obtained. It will then be possible to construct maps and data sheets showing how thunderstorms move and how the weather in them varies as the storm builds up or decreases in intensity. From this research and investigation, scientific rules can be developed to provide safety procedures for flying thunderstorms.

It is planned to continue the study next year by investigating thunderstorms associated with vigorous cold fronts—the leading edges of cold air masses that push down across the United States from the north. ☆

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PICTURE CREDITS

P. 24 XB-36 Consolidated Vultee; P. 25 British Ministry of Information.

All other photographs in this issue were secured through official Army Air Forces and Signal Corps sources. Requests for prints and photographs for official use and publication should be directed to the AAF Photographic Library, Headquarters, AAF, Washington 25, D. C. All other requests must be forwarded to the original source.

Questions on Policy and Procedure

Q. What qualifications and skills should an individual have before applying for reclassification as a radio repairman?
A. *The requirements and necessary qualifications for the MOS Radio Repairman (SSN 648) are prescribed by AAF Training Standard 80-648, 20 May 1946.*

Q. How should AAF first aid kits which contain narcotics be shipped after being removed from surplus aircraft in the United States?
A. *Narcotics must first be removed from first aid kits and shipped by express under separate cover as security cargo. (AAF Ltr 65-115, 21 May 1946).*

Q. Does excessive time lost under Article of War 107 disqualify an individual from enlistment or reenlistment in the AAF?
A. *Yes. If time lost under the 107th AW during the last period of enlistment or active duty exceeds 30 days, the individual concerned is disqualified for enlistment or reenlistment. (Sec II, WD Cir 144, 1946).*

Q. May an individual who was awarded an aviation badge while in an officer status be entitled to wear such badge in an enlisted status?
A. *Yes. AAF has indicated that such awards, if properly earned, may be worn while in an enlisted status. However, such authorization is subject to the provisions of paragraphs 3 and 4, AAF Regulation 35-27, 11 December 1943.*

Q. May an officer's commission be revoked after he accepts a commission in the Regular Army?
A. *Yes. The commission of any officer may be revoked through action by The Secretary of War regardless of length of active duty prior to his acceptance of a commission in the Regular Army. Any officer whose commission is revoked will be discharged from the army. (WD Cir 152, 1946).*

Answers to "How Sharp are You"

Photo and Questions on Page 2

1. False, P-39
2. True
3. True
4. False, P-51
5. True
6. False, C-97

NEW BOOKS

WAR

MY THREE YEARS WITH EISENHOWER. *Harry C. Butcher.* The personal diary of Captain Harry C. Butcher, USNR. N. Y., SIMON & SCHUSTER, 1946.

THE GERMAN AIR FORCE. *Asher Lee.* The story of the Luftwaffe from its beginning to the ignominious end. N. Y., HARPER & BRO., 1946.

THE LAST PHASE. *Walter Millis.* A brief, lucid account of the events in the Western European Theater from 6 June 1944 to 8 May 1945. N. Y., HOUGHTON-MIFFLIN, 1946.

LAST CHAPTER. *Ernie Pyle.* A brief record which completes Ernie Pyle's report on the war. N. Y., HOLT, 1946.

POST-WAR

THE ABSOLUTE WEAPON: ATOMIC POWER AND WORLD ORDER. *Frederick S. Dunn, and others.* A realistic appraisal of the effect of the atomic bomb on military science and international relations. N. Y., HARCOURT, BRACE, 1946.

TECHNICAL

ENDLESS HORIZONS. *Vannevar Bush.* Papers, official reports and articles of an outstanding American scientist. WASHINGTON, AMERICAN COUNCIL ON PUBLIC AFFAIRS, 1946.

SHOP TERMS. *Department of Education, International Business Machines Corp.* A comprehensive and authoritative reference manual. SYRACUSE, N. Y., SYRACUSE UNIVERSITY PRESS, 1945.

THE BUSINESS LAW OF AVIATION. *Dykstra and Dykstra.* A convenient compilation of the leading court decisions which have involved some aspect of aviation. N. Y., MC GRAW-HILL, 1946.

INDUSTRIAL ELECTRIC LAMPS AND LIGHTING. *Edwin S. Lincoln.* Detailed instructions on lighting, including emergency lighting and equipment. N. Y., DUELL, SLOAN & PEARCE, 1945.

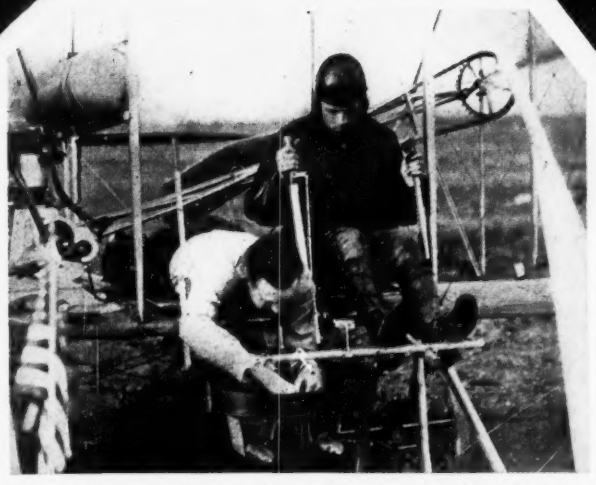
THS IS PHOTOGRAPHY: ITS MEANS AND ENDS. *Miller and Brumitt.* Photographic fundamentals on a wide range of topics. N. Y., GARDEN CITY PUBLISHING CO., 1945.

YEARBOOKS

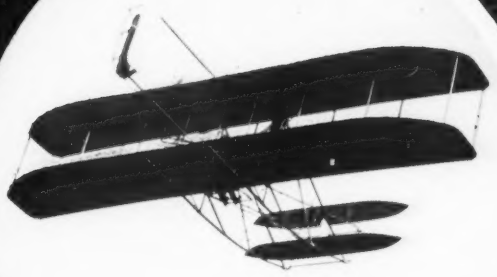
IT HAPPENED IN 1945. *International News Service. Edited by Clark Kinnaird.* A biography of the year 1945, including happenings in science, aviation and the war. N. Y., DUELL, SLOAN & PEARCE, 1946.

These books are available to AAF personnel through the AAF Technical Library Service, which provides for technical libraries at all major installations. For a complete list of books so available, see TECHNICAL PUBLICATIONS FOR ARMY AIR FORCES TECHNICAL LIBRARIES, Book List No. 2, March 1945 and supplements thereto. These lists are compiled by the Technical Library Section, Personnel Services Division, Headquarters AAF. Personal copies of these books may be obtained from the publishers or retail bookstores.

The Album BOMBERS

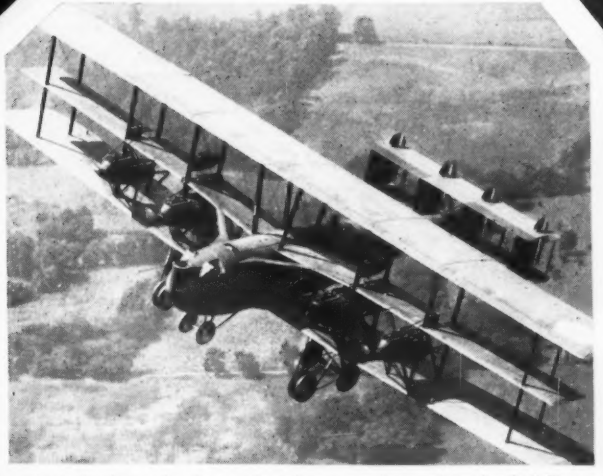


In 1911 Lt. R. E. Scott dropped bombs with the aid of this dishpan device. From his trials evolved bombing tables.

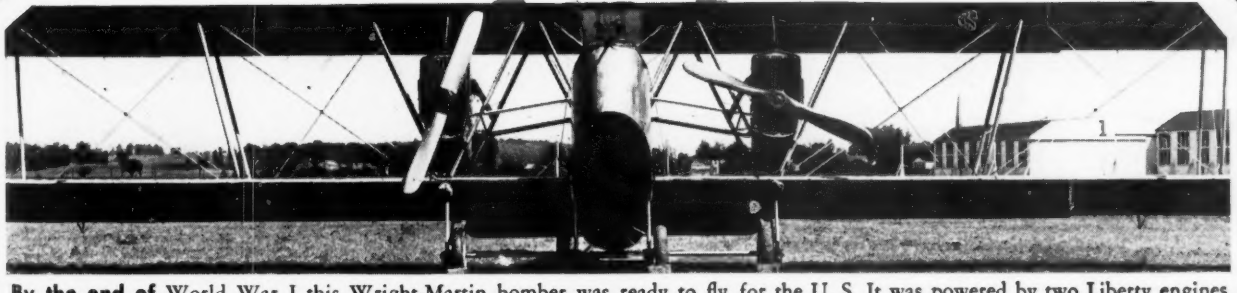


When Orville Wright remained aloft 62 minutes in 1908 it was predicted that planes might carry bombs.

This Wright Model "F" which flew near Dayton, Ohio, in 1914 proved value of streamlined fuselage.



First design of a heavy bomber was the multi-wheeled Barling of 1923. It had six engines, four tractors, two pushers.



By the end of World War I this Wright-Martin bomber was ready to fly for the U. S. It was powered by two Liberty engines and mounted machine guns in its nose. Designs and materials for large wings without external wire bracing had not been perfected.

CHART YOUR FUTURE BY THIS STAR